

AD-A155 455

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS VAN 1/1  
HORN PARK UPPER D. (U) CORPS OF ENGINEERS WALTHAM MA  
NEW ENGLAND DIV JUL 78

1/10/1965/10

8/10 12/12 NI

END  
DATE  
FILMED  
8-85  
DTN



**MICROCOPY RESOLUTION TEST CHART**  
**NATIONAL BUREAU OF STANDARDS-1963-A**

AD-A155 455

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

| REPORT DOCUMENTATION PAGE  |                       | READ INSTRUCTIONS<br>BEFORE COMPLETING FORM                    |
|--|-----------------------|--|
| 1. REPORT NUMBER<br>MA 00574   | 2. GOVT ACCESSION NO. | 3. RECIPIENT'S CATALOG NUMBER                                  |
| 4. TITLE (and Subtitle)<br>Van Hirn Park Upper Dam<br>NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS  |                       | 5. TYPE OF REPORT & PERIOD COVERED<br>INSPECTION REPORT        |
| 7. AUTHOR(s)<br>U.S. ARMY CORPS OF ENGINEERS<br>NEW ENGLAND DIVISION   |                       | 6. PERFORMING ORG. REPORT NUMBER                               |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS  |                       | 8. CONTRACT OR GRANT NUMBER(s)                                 |
| 11. CONTROLLING OFFICE NAME AND ADDRESS<br>DEPT. OF THE ARMY, CORPS OF ENGINEERS<br>NEW ENGLAND DIVISION, NEDED<br>424 TRAPELO ROAD, WALTHAM, MA. 02254  |                       | 10. PROGRAM ELEMENT, PROJECT, TASK<br>AREA & WORK UNIT NUMBERS |
| 14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)  |                       | 12. REPORT DATE<br>July 1978                                   |
|  |                       | 13. NUMBER OF PAGES<br>60                                      |
|  |                       | 15. SECURITY CLASS. (of this report)<br><br>UNCLASSIFIED       |
|  |                       | 15a. DECLASSIFICATION/DOWNGRADING<br>SCHEDULE                  |
| 16. DISTRIBUTION STATEMENT (of this Report)<br><br>APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED   |                       |  |
| 17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)   |                       |  |
| 18. SUPPLEMENTARY NOTES<br>Cover program reads: Phase I Inspection Report, National Dam Inspection Program;<br>however, the official title of the program is: National Program for Inspection of<br>Non-Federal Dams; use cover date for date of report.   |                       |  |
| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number)<br>DAMS, INSPECTION, DAM SAFETY,<br>Connecticut River Basin<br>Springfield, Massachusetts   |                       |  |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br><br>Some existing deficiencies regarding maintenance operation of the project<br>features were observed. A Design Flood was developed that was equivalent<br>to one half the Probable Maximum Flood. No remedial measures are required<br>by the owner at the present time. |                       |  |

## **DISCLAIMER NOTICE**

**THIS DOCUMENT IS BEST QUALITY  
PRACTICABLE. THE COPY FURNISHED  
TO DTIC CONTAINED A SIGNIFICANT  
NUMBER OF PAGES WHICH DO NOT  
REPRODUCE LEGIBLY.**



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02154

REPLY TO  
ATTENTION OF  
NEDED

OCT 10 1978

Honorable Michael S. Dukakis  
Governor of the Commonwealth of  
Massachusetts  
State House  
Boston, Massachusetts 02133

Dear Governor Dukakis:

I am forwarding to you a copy of the Van Horn Park Upper Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

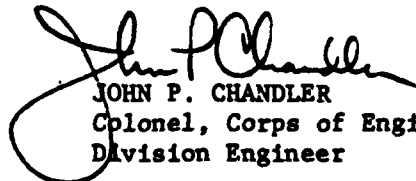
A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, The City of Springfield, c/o Superintendent of Parks and Maintenance, 15 Fayette Street, Springfield, Massachusetts 01118.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

Incl  
As stated

  
JOHN P. CHANDLER  
Colonel, Corps of Engineers  
Division Engineer

**VAN HORN PARK UPPER DAM  
MA 00574**

**CONNECTICUT RIVER BASIN  
SPRINGFIELD, MASSACHUSETTS**

**PHASE 1 INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM**

|                    |  |
|--------------------|--|
| Accession For      |  |
| NTIS GRA&I         | <input checked="checked" type="checkbox"/> |
| DTIC TAB           | <input type="checkbox"/>                   |
| Unannounced        | <input type="checkbox"/>                   |
| Justification      |  |
| By _____           |  |
| Distribution/      |  |
| Availability Codes |  |
| Dist               | Avail and/or<br>Special                    |
| A/                 | 27   |

## PHASE I REPORT

### NATIONAL DAM INSPECTION PROGRAM

|                     |                               |
|---------------------|-------------------------------|
| Inventory No.:      | MA 00574                      |
| Name of Dam:        | VAN HORN PARK UPPER DAM       |
| Town Located:       | SPRINGFIELD                   |
| County Located:     | HAMPDEN                       |
| State Located:      | COMMONWEALTH OF MASSACHUSETTS |
| Stream:             | NOT APPLICABLE                |
| Date of Inspection: | 1 JUNE 1978                   |

### ASSESSMENT

Examination of available documents and visual inspection of the Van Horn Park Upper Dam and appurtenant structures did not reveal any conditions which would render the project inadequate. Some existing deficiencies regarding maintenance and operation of the project features were observed.

Because there are no data on Probable Maximum Floods or Standard Project Floods for drainage areas of comparable size and condition, a design flood hydrograph was synthesized for the contributing area. A Design Flood was developed that was equivalent to one half the Probable Maximum Flood. The resulting inflow hydrograph has a one hour duration peak discharge of 1180 cfs and a runoff volume equivalent to 11.5 inches in 9 hours. Routing this flood through the reservoir, using computerized techniques, resulted in a maximum discharge of 755 cfs with the pool rising to within 0.2 feet of overtopping the dam (El. 175).

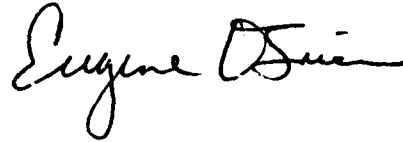
Since the dam is not expected to be overtopped with an inflow equal to the runoff from one half the Probable Maximum Flood, it is considered that the dam design is adequate from a hydrologic and hydraulic standpoint.

No remedial measures are required by the owner at the present time. However, certain measures are recommended for short term implementation, and others, as part of a normal maintenance program. These measures are as follows:

- Programs for observing and monitoring seepage and structural movements.



- Repair and maintenance of dam and appurtenant structures.
- Programs for operation, maintenance and inspection.

A handwritten signature in cursive script, appearing to read "Eugene O'Brien".

Eugene O'Brien, P.E.  
New York No. 29823

This Phase I Inspection Report on Van Horn Park Upper Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.



CHARLES G. TIERSCH, Chairman  
Chief, Foundation and Materials Branch  
Engineering Division

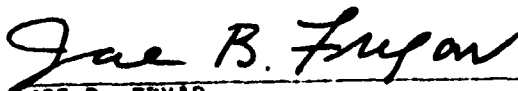


FRED J. RAVENS, Jr., Member  
Chief, Design Branch  
Engineering Division



SAUL COOPER, Member  
Chief, Water Control Branch  
Engineering Division

APPROVAL RECOMMENDED:



JOE B. FRYAR  
Chief, Engineering Division

JUL 14 1978

## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

CONNECTICUT RIVER BASIN  
INVENTORY NO. MA 00574  
VAN HORN PARK UPPER DAM  
PHASE I INSPECTION REPORT

CONTENTS

|                                    | <u>Page No.</u> |
|------------------------------------|-----------------|
| - ASSESSMENT                       |                 |
| - OVERVIEW PHOTOGRAPH              |                 |
| - VICINITY MAP                     |                 |
| - TOPOGRAPHIC MAP (USGS)           |                 |
| 1 PROJECT INFORMATION              | 1               |
| 1.1 GENERAL                        | 1               |
| a. Authority                       | 1               |
| b. Purpose                         | 1               |
| 1.2 DESCRIPTION OF THE PROJECT     | 1               |
| a. Description of Dam              | 1               |
| b. Location                        | 2               |
| c. Ownership                       | 2               |
| d. Purpose of Dam                  | 2               |
| e. Design and Construction History | 2               |
| f. Normal Operating Procedures     | 3               |
| g. Size Classification             | 3               |
| h. Hazard Classification           | 3               |
| i. Operator                        | 3               |
| 1.3 PERTINENT DATA                 | 4               |
| a. Drainage Areas                  | 4               |
| b. Discharge at Damsite            | 4               |
| c. Elevation                       | 4               |
| d. Reservoir                       | 4               |
| e. Storage                         | 5               |
| f. Reservoir Surface               | 5               |
| g. Dam                             | 5               |
| h. Diversion and Regulating Tunnel | 5               |
| i. Spillway                        | 5               |
| j. Regulating Outlets              | 5               |

|     |                                      | <u>Page No.</u> |
|-----|--------------------------------------|-----------------|
| 2   | ENGINEERING DATA                     | 7               |
| 2.1 | DESIGN                               | 7               |
| 2.2 | CONSTRUCTION RECORDS                 | 7               |
| 2.3 | OPERATION RECORDS                    | 7               |
| 2.4 | EVALUATION OF DATA                   | 7               |
| 3   | VISUAL INSPECTION                    | 8               |
| 3.1 | FINDINGS                             | 8               |
| a.  | General                              | 8               |
| b.  | Embankment                           | 8               |
| c.  | Appurtenant Structures               | 9               |
| d.  | Abutments                            | 9               |
| e.  | Downstream Channel                   | 9               |
| f.  | Reservoir Area                       | 10              |
| 3.2 | EVALUATION OF OBSERVATIONS           | 10              |
| 4   | OPERATION AND MAINTENANCE PROCEDURES | 11              |
| 4.1 | PROCEDURES                           | 11              |
| 4.2 | MAINTENANCE OF DAM                   | 11              |
| 4.3 | MAINTENANCE OF OPERATING FACILITIES  | 11              |
| 4.4 | WARNING SYSTEMS IN EFFECT            | 11              |
| 4.5 | EVALUATION                           | 11              |
| 5   | HYDRAULIC/HYDROLOGIC                 | 12              |
| 5.1 | DRAINAGE AREA CHARACTERISTICS        | 12              |
| 5.2 | SPILLWAY CAPACITY                    | 12              |
| 5.3 | RESERVOIR                            | 12              |
| 5.4 | FLOODS OF RECORD                     | 12              |

|   | <u>Page No.</u> |
|---|-----------------|
| 5.5 DESIGN FLOOD                                | 12              |
| 5.6 OVERTOPPING POTENTIAL                       | 13              |
| 5.7 EVALUATION                                  | 14              |
| 6 STRUCTURAL STABILITY                          | 15              |
| 6.1 EVALUATION OF STRUCTURAL STABILITY          | 15              |
| a. Visual Observations                          | 15              |
| b. Design and Construction Data                 | 15              |
| c. Operating Records                            | 15              |
| d. Post-construction Changes                    | 15              |
| e. Seismic Stability                            | 15              |
| 7 ASSESSMENT, RECOMMENDATIONS&REMEDIAL MEASURES | 16              |
| 7.1 DAM ASSESSMENT                              | 16              |
| a. Safety                                       | 16              |
| b. Adequacy of Information                      | 16              |
| c. Urgency                                      | 16              |
| d. Necessity for Additional Investigation       | 16              |
| 7.2 RECOMMENDATIONS                             | 17              |
| 7.3 REMEDIAL MEASURES                           | 17              |
| a. Alternatives                                 | 17              |
| b. O & M Maintenance and Procedures             | 17              |

#### APPENDICES

- A. VISUAL INSPECTION CHECKLIST
- B. DRAWINGS AND INSPECTION REPORTS
  - 1. Proposed Outlet Works, Plan and Details
  - 2. Proposed Outlet Works, Borings & Miscellaneous Details
  - 3. Proposed Outlet Works, Upper Pond Outlet
  - 4. Sewer & Low Level Outlet Plan
  - 5. Soil Profile, Van Horn Park Upper Dam
  - 6. Past Inspection Reports
- C. PHOTOGRAPHS
- D. HYDROLOGIC DATA AND COMPUTATIONS
- E. INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS



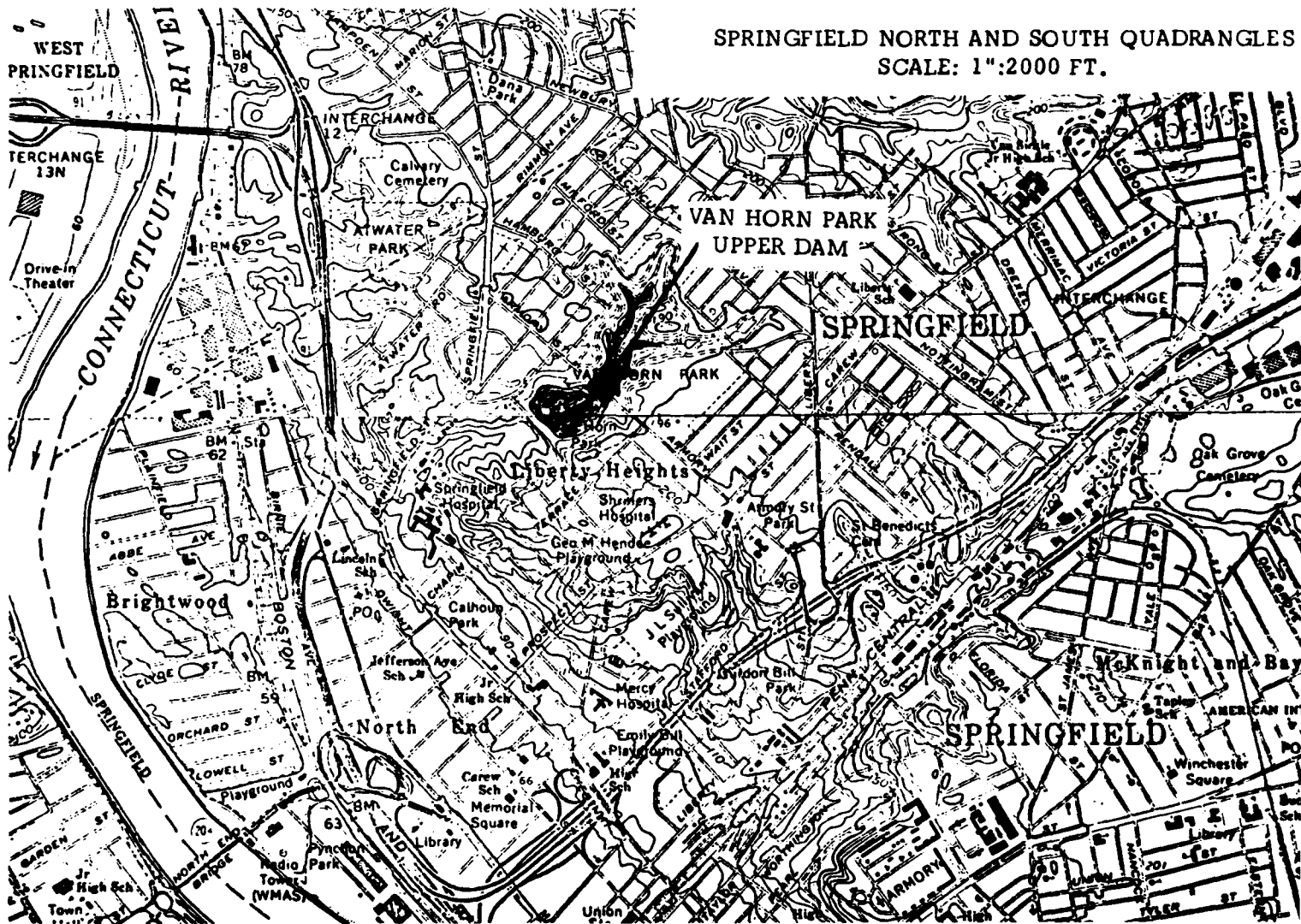
① GENERAL OVERVIEW OF UPSTREAM SLOPE OF DAM AND POND



VICINITY MAP  
VAN HORN PARK UPPER DAM



SPRINGFIELD NORTH AND SOUTH QUADRANGLES  
SCALE: 1":2000 FT.



TOPOGRAPHIC MAP  
VAN HORN PARK UPPER DAM

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
CONNECTICUT RIVER BASIN  
INVENTORY NO. MA 00574  
VAN HORN PARK UPPER DAM  
CITY OF SPRINGFIELD  
HAMPDEN COUNTY, COMMONWEALTH OF MASSACHUSETTS

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Tippetts-Abbott-McCarthy-Stratton has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Tippetts-Abbott-McCarthy-Stratton under a letter of May 3, 1978, from Mr. Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW 33-78-C-0298 has been assigned by the Corps of Engineers for this work.

b. Purpose

- (1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
- (2) Encourage and prepare the States to initiate quickly effective dam safety programs for non-Federal dams.
- (3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF THE PROJECT

a. Description of Dam

The Van Horn Park Upper Dam is an earth dam about 550 feet long with a maximum height of 32 feet and crest width of 50 feet. The upstream and downstream slopes of the embankment as observed are approximately 1(V): 1.5(H) and 1(V): 2(H), respectively. Both slopes are covered with a heavy

growth of trees, bushes, shrubs and ground cover. The crest of the dam serves as a roadway and sidewalk for Armory Street.

Located approximately at the center of the dam is an uncontrolled outlet for the pond consisting of a reinforced concrete double box culvert and spillway chute. The twin barrels are 8 ft. wide, 5 ft. high, 60 ft. long, and are on a slope of 0.5 percent. The invert or sill of the box culvert is at El. 168.5. The approach to the culvert is riprapped for a distance of 10 feet. Discharges through the culvert are carried to the Van Horn Park Lower Pond by a reinforced concrete spillway chute which is 17 feet wide at its upstream end and narrows to 10 feet at approximately mid-length. The walls of the chute are 6 to 10 feet high. The chute floor slopes from El. 167.5 to El. 143.52. Adjacent to the spillway chute on three sides is a 10 feet wide zone of riprap protection consisting of 36 inch stone.

There is also an uncontrolled low level outlet located at the north abutment. This outlet consists of a series of 12 inch, 15 inch and 18 inch diameter vitrified clay pipes having a total length of about 1090 feet. The pipe runs parallel with the north shore of the Van Horn Lower Pond, outfalls into a brook which flows approximately parallel to and at the downstream toe of the Van Horn Lower Dam.

b. Location

The dam is located in the northern section of the City of Springfield approximately 1 mile east of the Connecticut River. Apparently there are no streams of any significant size supplying water to the pond.

c. Ownership

The Van Horn Park Upper Dam is owned by the City of Springfield. The day-to-day operation and maintenance is managed by the Park Department, Forest Park Office, City of Springfield.

d. Purpose of Dam

The impoundment provided by the dam is for recreational purposes.

e. Design and Construction History

Original design and construction records are not available. In 1957, modifications to the dam were made to include the existing box culvert and chute. The design modifications were carried out by Green Engineering Affiliates, Inc., Boston, Mass. The construction records for this modification are not available.

f. Normal Operating Procedures

There are no normal operating procedures since all flows from the pond are uncontrolled. The outflow eventually enters the City of Springfield's storm sewer system and then into the Connecticut River.

g. Size Classification

The dam is less than 40 feet high and has a storage capacity of less than 1000 acre-feet, therefore it is classified as a "small" dam.

h. Hazard Classification

The dam is in a "low" hazard potential category due to the fact that should the dam fail, the flood wave would be absorbed by the Van Horn Park Lower Pond. The only loss would be the destruction of a section of Armory Street.

i. Operator

The person responsible for the day-to-day operation of the dam is:

Mr. Albert Poehler  
Superintendent of Parks and Maintenance  
15 Fayette Street  
Springfield, Mass., 01118  
Telephone No. (Home) 413-778-4605  
(Office) 413-732-2181

### 1.3 PERTINENT DATA

#### a. Drainage Areas

The Van Horn Park Upper Dam controls the drainage from a depressed basin within the City of Springfield, Mass., with no defined drainage channels. The total contributing area is given as 0.41 square mile (262 acres). Of the total area about 62 acres is undeveloped park and 200 acres is developed urban area.

The urban area surrounding the park is served by storm sewers which carry the runoff from frequent storms away from the topographic basin. In a major storm, the runoff would exceed the design capacity of the sewers, and excess runoff would flow overland to the pond.

#### b. Discharge at Damsite

The spillway for the Van Horn Park Upper Dam is a double box culvert, each barrel is 8 ft wide and 5 ft high, 60 ft long, and is on a slope of 0.5 percent. The culvert is located on the top of the dam. El. 175, with an invert or sill at El. 168.5, 6.5 feet below the crest of the dam. The design capacity given on construction drawings is 730 cfs, which is estimated to be the capacity with the water surface at El. 174.7 or 0.3 feet below the crest of the dam. The design capacity is equal to 1780 cfs per square mile (2.79 cfs per acre).

There is no record of the maximum flood at the damsite.

#### c. Elevation (ft. above MSL, Springfield Datum)

|                                |                |
|--------------------------------|----------------|
| Top dam                        | 175.0          |
| Maximum pool-design surcharge  | Unknown        |
| Full flood control pool        | Not Applicable |
| Recreation pool                | 168.5          |
| Spillway crest (gated)         | Not Applicable |
| Upstream portal invert         |                |
| diversion tunnel               | Not Applicable |
| Downstream portal invert       |                |
| diversion tunnel               | Not Applicable |
| Streambed at centerline of dam | Not Applicable |
| Maximum tailwater              | Unknown        |

#### d. Reservoir

|                              |                |
|------------------------------|----------------|
| Length of maximum pool       | 1600± feet     |
| Length of recreation pool    | 1500± feet     |
| Length of flood control pool | Not Applicable |

- e. Storage (acre-feet)
- |                    |                |
|--------------------|----------------|
| Recreation pool    | Unavailable    |
| Flood control pool | Not Applicable |
| Design surcharge   | Unknown        |
| Top of dam         | 96             |
- f. Reservoir Surface (acres)
- |                    |                |
|--------------------|----------------|
| Top dam            | 19             |
| Maximum pool       | 19             |
| Flood-control pool | Not Applicable |
| Recreation pool    | 9.6            |
| Spillway crest     | 9.6            |
- g. Dam
- |                   |                    |
|-------------------|--------------------|
| Type              | Earth              |
| Length            | 550 feet (approx.) |
| Height            | 32 feet            |
| Top width         | 57 feet            |
| Side Slopes - U/S | 1(V):1.5(H)        |
| D/S               | 1(V):2(H)          |
| Zoning            | Unknown            |
| Impervious core   | Unknown            |
| Cutoff            | Unknown            |
| Grout curtain     | Unknown            |
| Other             | None               |
- h. Diversion and Regulating Tunnel
- |                       |                |
|-----------------------|----------------|
| Type                  | Not Applicable |
| Length                | Not Applicable |
| Closure               | Not Applicable |
| Access                | Not Applicable |
| Regulating facilities | Not Applicable |
- i. Spillway
- |                 |   |
|-----------------|---|
| Type            | Reinforced Concrete Chute                                 |
| Length of weir  | 17 feet   |
| Crest elevation | 167.5 feet  |
| Gates           | None  |
| U/S channel     | None  |
| D/S channel     | Short natural channel, then into Van Horn Park Lower Pond |
| General         | None  |
- j. Regulating Outlets
- The regulating outlet consist of an uncontrolled reinforced double

1 ..

concrete box culvert and spillway chute. The twin barrels are 8 feet wide, 5 ft high and 60 ft long, and are on a slope of 0.5 percent. The invert of the box culvert is El 168.5. The approach to the culvert is riprapped for a distance of 10 feet. Discharges through the culvert are carried to the Van Horn Park Lower Pond by a reinforced concrete spillway chute which is 17 ft wide at its upstream end and narrows to 10 feet at approximately mid-length. The walls of the chute are 6 to 10 feet high. The chute floor slopes from El 167.5 to El 142.5.

There is also an uncontrolled low level outlet located at the north abutment. This outlet consists of a series of 12, 15 and 18 inch diameter vitrified clay having a total length of approximately 1090 feet.

## SECTION 2: ENGINEERING DATA

### 2.1 DESIGN

Design data, drawings or specific memoranda are not available for the original construction of the dam. However, there are contract drawings available for the alterations which were designed in 1957 by Green Engineering Affiliates Inc., Boston. (See Appendix)

These drawings are entitled:

- a. Proposed Outlet Works, Plan and Details
- b. Proposed Outlet Works, Borings & Miscellaneous Details
- c. Proposed Outlet Works, Upper Pond Outlet

There is minimal information on subsurface conditions obtained from 1 boring drilled for the modification study. The boring log is shown on the drawing given in (b) above. The boring information has been used to develop a soils profile which is shown in the Appendix. There are no test results available from this subsurface exploration program.

### 2.2 CONSTRUCTION RECORDS

There are no detailed construction records available.

### 2.3 OPERATION RECORDS

No operation records are available and there is no daily record kept of pool elevation or rainfall at the dam site.

### 2.4 EVALUATION OF DATA

Existing information was made available by Department of Streets and Engineering, Springfield, Mass.; Office of the County Commissioners, County of Hampden; and Department of Environmental Quality Engineering, Division of Waterways, Boston, Mass. The drawings available contain information which indicates conditions in 1957 when modifications were designed. They do not indicate "as built conditions". However, the data reviewed are considered adequate for this Phase I inspection and evaluation.



## SECTION 3: VISUAL INSPECTION

### 3.1 FINDINGS

#### a. General

A visual inspection of the Van Horn Park Upper Dam was made on June 1, 1978. The weather was sunny, temperature between 75° and 80°F. The last rainfall, a heavy shower of short duration occurred the night before. At the time of the inspection the pool level was at approximately El 168.6+ which is 2 inches above the invert elevation of the box culvert.

#### b. Embankment

The earth embankment is heavily overgrown with vegetation on both slopes but shows no signs of distress. The horizontal alignment of the crest appears in good condition. The crest has a vertical curve with its lowest point in the vicinity of the box culvert crossing. This curvature, however, does not appear to be caused by settlement but is part of the design profile of Armory Street. (See Photograph). There are locally a few superficial longitudinal and transverse cracks with minor vertical displacements in the roadway and sidewalks which traverse the crest, especially in the vicinity of the box culvert crossing. In general, however, the roadway pavement is in good condition.

The upstream slope of the embankment shows evidence of some erosion and sloughing as a result of runoff, with some erosion as a result of trespassing. The heavy vegetation makes it impossible to discern whether there are cracks on the slope surface. The downstream slope, shows signs of erosion, sloughing and seepage. The causes of the erosion and sloughing are generally the same as those at the upstream slope.

There are two areas of seepage, one located approximately 45 feet south of the spillway chute and covers an area of approximately 300 square feet. In the center of this area, at approximately the toe of the slope at El. 143+ a rivulet is flowing at the rate of approximately 5 gpm. It appears that this condition has existed for some time since it was noted in a previous inspection report prepared by the Commonwealth. In the area of seepage there are signs of limonitic staining and algae growth (See Photograph). A second rivulet, at approximately the same elevation, is located in a gully eighty feet south of the spillway chute. The gully has been formed by storm water flowing from a 12 inch diameter concrete bell and spigot drain pipe attached to a roadway catch basin. The gully starts about 20 feet downstream from the edge of the crest and is about 3 feet deep until it reaches the toe. (See Photograph).

Eighty feet north of the spillway chute, another catch basin drain has created a similar gully, however, there is no apparent seepage at this location. At the end of the drain, a pothole has formed, 20 feet in diameter and 5 feet deep. (See Photograph). An attempt has been made to reduce the erosion by the placement of large boulders at the outlet of the pipe. Downstream of the pothole, the drain water has incised a channel approximately 3 feet wide and 3 feet deep. The channel leads directly into the Van Horn Lower Pond.

At the south abutment, there is a small pond which is drained by a brook flowing along the downstream toe of the dam and then into the Van Horn Lower Pond.

c. Appurtenant Structures

The reinforced box culvert appears to be in good condition with only little debris in evidence. The upstream culvert headwalls have separated from the culvert and are displaced upstream approximately 2 inches. (See Photograph). Immediately beyond the headwalls there is riprap protection, approximately 10 ft wide, which has been covered with asphalt; it serves as slope protection against erosion by runoff from the paved crest. (See Photograph). On top of the box culvert, 2-1/2 feet from the upstream edge, a metal pipe approximately 12 inch diameter, covered with asphalt, crosses the culvert. The pipe is anchored by means of two U-bolts to the underside of the roof of the culvert.

The spillway chute which consists of three reinforced concrete monoliths is in relatively good condition. There is evidence of minor spalling of the concrete surface and erosion at the contact of the walls with the floor. The lower downstream section has settled non-uniformly, approximately 4 inches on the south side and 1 inch on the north side, with an approximate downstream displacement of 2 inches. The upper section has separated from the box culvert about 1/2 inch in downstream direction. Riprap protection which surrounds the spillway chute is covered with vegetation and on the south side, near the culvert head wall, it has undergone approximately 6 inches of settlement. At the downstream end of the chute, the riprap has moved probably by flood flows.

The intake for the low level outlet pipe was not visible, however, water was seen emerging at the outlet located below the Van Horn Park Lower Dam. The quantity of flow from the outlet was considerably less than expected, leading to the suspicion that the intake may be clogged.

d. Abutments

There were no signs of seepage or other unusual conditions at the abutments. The only exception is the presence of the pond described above.

e. Downstream Channel

There is for practical purposes no downstream channel. The

spillway chute leads directly into the Van Horn Park Lower Pond. The small channel which does exist is partially blocked with debris but does not, in its present state, impede discharges.

f. Reservoir Area

In the vicinity of the dam there is no evidence of sloughing, potentially unstable slopes or other unusual conditions which would adversely affect the dam.

3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the inspection revealed several deficiencies which at present do not adversely affect the adequacy of the dam. However, these deficiencies do require immediate attention and should be corrected before further deterioration leads to a hazardous condition. Recommended measures to improve these conditions are given in SECTION 7.

## SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

### 4.1 PROCEDURES

There are no established operational procedures for the project.

### 4.2 MAINTENANCE OF DAM

There is no operation or maintenance manual for the project. There is no program set up for inspections by City personnel. There is a statewide program of inspection established several years ago by the Department of Environmental Quality Engineering, Division of Waterways. A copy of their last inspection report, dated February 1977, is given in the Appendix.

### 4.3 MAINTENANCE OF OPERATING FACILITIES

There is no established maintenance program for the operating facilities.

### 4.4 WARNING SYSTEMS IN EFFECT

There is no warning system in effect or contemplated.

### 4.5 EVALUATION

The maintenance of the dam and appurtenant structures is virtually non-existent except that repairs to the street pavement are routinely done by the Department of Streets and Engineering personnel.

## SECTION 5: HYDRAULIC/HYDROLOGIC

### 5.1 DRAINAGE AREA CHARACTERISTICS

The Van Horn Park Upper Dam controls the drainage from a depressed basin within the City of Springfield, Mass., with no defined drainage channels. The total contributing area is given as 0.41 square mile (262 acres). Of the total area about 62 acres is undeveloped park and 200 acres is developed urban area. A pond with a normal water area of 9.6 acres is located within the park and immediately above the dam. The water area may increase to approximately 19 acres at an elevation corresponding to the top of the dam.

The urban area surrounding the park is served by storm sewers which carry the runoff from frequent storms away from the topographic basin. In a major storm, the runoff would exceed the design capacity of the sewers, and excess runoff would flow overland to the pond.

### 5.2 SPILLWAY CAPACITY

The spillway for the Van Horn Park Upper Dam is a double box culvert, each barrel is 8 ft wide and 5 ft high, 60 ft long, and is on a slope of 0.5 percent. The culvert is located on the top of the dam (El. 175), with an invert or sill at El. 168.5, or 6.5 feet below the crest of the dam. The design capacity given on construction drawings is 730 cfs, which is estimated to be the capacity with water surface at El. 174.7 and 0.3 feet below the crest of the dam. The design capacity is equal to 1780 cfs per square mile (2.79 cfs per acre).

### 5.3 RESERVOIR

If the pond were allowed to fill to the crest of the dam, the total storage between the crest and the invert of the culvert would be approximately 96 acre-feet, which is equivalent to 4.4 inches of runoff from the contributing area.

### 5.4 FLOODS OF RECORD

There are no records of flow from this small drainage area, and no records of the maximum water elevation in the pond.

### 5.5 DESIGN FLOOD

Because there are no data on Probable Maximum Floods for an area of 0.41 square mile, and particularly for a partially urbanized area, it was necessary to synthesize a design flood hydrograph for the contributing area. Initially a depth-duration relation for maximum probable point rainfall (10 square mile area), for durations from 6 hours to 24 hours, was taken from Weather Bureau

sources. <sup>(1)</sup> The distribution of the rainfall for durations from 1 to 6 hours was based on data in a publication of the World Meteorological Organization. <sup>(2)</sup> An estimate of a probable Design Storm was made considering the approximate relation that the flood derived from such a storm is about half the Probable Maximum Flood. Increments of depth from the depth-duration relation at one-hour intervals were arranged in a probable storm sequence given below:

| <u>Time</u><br><u>(hours)</u> | <u>Precipitation</u><br><u>(inches)</u> |
|-------------------------------|---|
| 1.0                           | 0.16                                    |
| 2.0                           | 0.50                                    |
| 3.0                           | 1.10                                    |
| 4.0                           | 2.65                                    |
| 5.0                           | 4.50                                    |
| 6.0                           | 1.40                                    |
| 7.0                           | 0.85                                    |
| 8.0                           | 0.16                                    |
| 9.0                           | <u>0.16</u>                             |
|                               | 11.48                                   |

Since runoff to the pond area will be overland flow from a narrow strip of land (averaging about 1500 ft in width), it was assumed that there would be no significant lag time and the runoff rate would be computed directly from the rate of precipitation. Also, because approximately 84 percent of the contributing area will be impervious urban area or water area, no infiltration losses were deducted. The resulting inflow hydrograph has a one-hour duration peak discharge of 1180 cfs and a runoff volume equivalent to 11.5 inches in 9 hours, 96 percent of which occurs in 6 hours. The hydrograph assumptions are conservative, but believed to be necessary in the evaluation of the adequacy of the dam.

#### 5.6 OVERTOPPING POTENTIAL

The adequacy of the spillway capacity has been tested by routing one-half the Probable Maximum Flood (see Par. 5.5) through the reservoir using a computerized routing technique. The water surface was assumed to be at the invert of the spillway box culvert (El 168.5) at the beginning of inflow. The routed flood came within 0.2 feet of overtopping at the dam (El. 175), and the maximum discharge was 755 cfs.

---

(1) Generalized Estimated of Maximum Possible Precipitation over the United States East of the 105th Meridian, Hydrometeorological Report No. 23, 1947.

(2) Manual for Estimation of Probable Maximum Precipitation, World Meteorological Organization, Operation Hydrology Report No. 1, 1973.

## 5.7 EVALUATION

Since the dam is not expected to be overtopped with an inflow to the pond equal to the runoff from one half the Probable Maximum Flood, it is considered that the dam design is adequate from a hydrologic and hydraulic standpoint.

## SECTION 6: STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

#### a. Visual Observations

Visual observations did not indicate any serious structural problems with the embankment, spillway chute or double box culvert. The deficiencies, which are described in Sections 3 and 4, require immediate attention; recommended remedial measures to improve these conditions are given in Section 7.

#### b. Design and Construction Data

No design computations or other data regarding the structural stability of the dam have been located.

On the basis of the performance experience, the visual inspection, as well as engineering judgement, the dam with the present reservoir level, is considered adequate.

#### c. Operating Records

There are no operating records kept or available. There are no records or reports of any operational problems which would affect the stability of the dam.

#### d. Post-construction Changes

It is reported that the dam was built sometime around 1900. There are no records of any construction changes that may have taken place prior to 1957. In 1957 Green Engineering Affiliates, Inc. Boston, Mass., undertook the design of the present box culvert and spillway chute. Details of the construction are not available.

#### e. Seismic Stability

The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines does not warrant seismic analyses.



## SECTION 7: ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

### 7.1 DAM ASSESSMENT

#### a. Safety

Phase I investigation of Van Horn Park Upper Dam does not indicate conditions which would constitute an immediate hazard to human life or property. Based on engineering judgment and the performance of the outlet works and earth embankment, the project is considered to be adequate under present conditions. The dam project however, does have a number of deficiencies which, if not remedied within a short time, have the potential for developing into hazardous conditions.

Because there are no data on Probable Maximum Floods for a drainage area of this size and condition, a design flood hydrograph was synthesized for the contributing area. An estimate of a probable Design Storm was developed considering the approximate relation that the flood derived from such a storm is about half the Probable Maximum Flood. The resulting inflow hydrograph has a one-hour duration peak discharge of 1180 cfs and a runoff volume equivalent to 11.5 inches in 9 hours. Routing this flood through the reservoir using computerized techniques, resulted in a maximum discharge of 755 cfs with the pool rising to within 0.2 feet of the dam crest.

Since the dam is not expected to be overtopped with an inflow to the pond equal to the runoff from one half the Probable Maximum Flood, it is considered that the dam design is adequate from a hydrologic and hydraulic standpoint.

#### b. Adequacy of Information

Information and data available have been found adequate for the Phase I investigation. However, there is a lack of information with regard to operation and maintenance of the project, as follows:

1. Record drawings and computations for the project
2. Operation and maintenance manuals
3. Records of hydrologic data

#### c. Urgency

The recommendations and remedial measures described below should be implemented by the owner within the next 12 months.

#### d. Necessity for Additional Investigations

Additional investigations to assess the adequacy of the dam and appurtenant structures do not appear necessary.

## 7.2 RECOMMENDATIONS

It is recommended that to correct deficiencies the following measures be undertaken by the owner shortly:

- a. Gullys and channels formed on the downstream slope should be filled with suitable compacted embankment material and restored to grade.
- b. Joints between box culvert and headwall, headwall and spillway chute, and between spillway chute sections should be sealed with appropriate joint filler material to prevent any further washing out of foundation materials.
- c. Riprap protection at the downstream end of the spillway chute should be cleared, rebuilt and inspected regularly, especially following heavy storms.
- d. Debris in the downstream channel should be removed and hauled away.
- e. Provisions should be made to remove the pond, located at the south abutment, and divert the brook away from the downstream toe.
- f. Heavy bush, shrubs, and young saplings should be removed from all locations on the embankment. Larger trees should not be removed but should be inventoried and their condition monitored. If a tree dies, the area around the tree should then be included in the inspection program for seepage.

## 7.3 REMEDIAL MEASURES

- a. Alternatives  
Not Applicable.
- b. O & M Maintenance and Procedures  
The owner should undertake shortly the following measures:
  - (1) Establishment of a systematic program of observation and monitoring of changes in quantity of seepage and suspended solids. Observations can be accomplished by the installation of weirs or flow meters. To control the seepage in the areas mentioned, and to obviate the possibility of piping and boiling, it may be necessary to construct a reverse filter

blanket with a weight berm. The filter layer should be made to "daylight" at the shoreline of the Lower Pond.

- (2) Establishment of a systematic program of inspection and monitoring of structural movements. This can be accomplished by the installation of simple measuring gauges or by the use of surveyed reference points.
- (3) Discharges from roadway drains should not be allowed to flow on the downstream slope. Drain pipes should be extended beyond the toe and made to outfall directly into Van Horn Park Lower Pond.
- (4) A formal program of operations, maintenance and inspection should be initiated.

**VISUAL INSPECTION CHECK LIST**

**APPENDIX A**

1 ..

VISUAL INSPECTION CHECK LIST  
PARTY ORGANIZATION

PROJECT VANHORN PARK UPPER DAM

DATE 6/1/78

TIME 13:30

WEATHER Sunny

W.S. ELEV. 168.5 U.S.  
W.S. ELEV. 146.5 DN.9

PARTY:

- |                              |           |
|------------------------------|-----------|
| 1. <u>Harvey S. Feldman</u>  | 6. _____  |
| 2. <u>Jyotindra H. Patel</u> | 7. _____  |
| 3. _____                     | 8. _____  |
| 4. _____                     | 9. _____  |
| 5. _____                     | 10. _____ |

| PROJECT FEATURE   | INSPECTED BY | REMARKS |
|---|--------------|---------|
| 1. <u>All project features inspected jointly by Party members</u> |              |         |
| 2. _____  |              |         |
| 3. _____  |              |         |
| 4. _____  |              |         |
| 5. _____  |              |         |
| 6. _____  |              |         |
| 7. _____  |              |         |
| 8. _____  |              |         |
| 9. _____  |              |         |
| 10. _____   |              |         |

# PERIODIC INSPECTION CHECK LIST

PROJECT VAN HORN PARK UPPER DAM DATE 6/1/78

PROJECT FEATURE \_\_\_\_\_ NAME \_\_\_\_\_

DISCIPLINE \_\_\_\_\_ NAME \_\_\_\_\_

## DAM EMBANKMENT

Crest Elevation \_\_\_\_\_

Current Pool Elevation \_\_\_\_\_

Maximum Impoundment to Date \_\_\_\_\_

Surface Cracks asphalt pavement on crest shows longitudinal & transverse cracks in region of box culvert. Sidewalk shows evidence of minor vertical displacement

Pavement Condition Generally in good condition on roadway and sidewalk except as noted above.

Movement or Settlement of Crest As noted above. Vertical alignment of the crest appears to dip with the lowest point in the vicinity of the box culvert. It appears this curvature is not a result of settlement but design profile of the road.

Lateral Movement None visible

Vertical Alignment No major deformation except noted above

Horizontal Alignment No major deformation

Condition at Abutment and at Concrete Structures Generally in good condition except noted below

Indications of Movement of Structural Items on Slopes upstream, Head wall of box culvert has been displaced towards upstream and separated from box section #2

Trespassing on Slopes Some evidence of pathways on both slopes

Sloughing or Erosion of Slopes or Abutments Some sloughing and erosion on both slopes

Rock Slope Protection - Riprap Failures Riprap around chute has settled; At lower end of chute riprap is displaced

Unusual Movement or Cracking at or near Toes None visible because of heavy vegetation

Unusual Embankment or Downstream Seepage Two seepage noted at downstream toe; One located 45 ft from the south of the spillway chute, saturated area 10' x 30'; Second is at 80 ft south of the spillway chute in a channel formed due to the storm flow from roadway drains. Also see misc. comments below.

Piping or Boils \_\_\_\_\_

Foundation Drainage Features None Visible

Toe Drains None Visible

Instrumentation System None Visible

Miscellaneous. Seepage flow in the first location is approximately 5 gal/min. On downstream face, two gullies were created by discharge from roadway drains. One at 80 ft south of spillway chute. This gully starts about 20 ft downstream from the edge of the crest and is about 3 feet deep until it reaches the toe where it is at ground level. Second gully is approximately 20 feet north of the spillway chute. In the vicinity of the outlet of the drain, a pothole has been formed approximately 20 ft diameter 5 ft deep. An attempt has been made to reduce the erosion by the placement of large boulders at the outlet of the pipe. Downstream of the pothole, the drain water has created an incised channel approximately 3 feet wide and 3 feet deep. This channel leads directly into the Van Horn Lower Pond.

PERIODIC INSPECTION CHECK LIST

PROJECT VAN HORN PARK UPPER DAM DATE 6/1/78  
PROJECT FEATURE \_\_\_\_\_ NAME \_\_\_\_\_  
DISCIPLINE \_\_\_\_\_ NAME \_\_\_\_\_

OUTLET WORKS - INTAKE CHANNEL AND  
INTAKE STRUCTURE

a. Approach Channel None  
Slope Conditions \_\_\_\_\_  
Bottom Conditions \_\_\_\_\_  
Rock Slides or Falls \_\_\_\_\_  
Log Boom \_\_\_\_\_  
Debris \_\_\_\_\_  
Condition of Concrete Lining \_\_\_\_\_  
Drains or Weep Holes \_\_\_\_\_

b. Intake Structure Two 8'x5' Box Culverts.  
Condition of Concrete Generally in good condition  
Stop Logs and Slots \_\_\_\_\_

Miscellaneous Slight debris in the culverts; 1/2"  
of running water on the culvert floor.



# PERIODIC INSPECTION CHECK LIST

PROJECT VAN HORN PARK UPPER DAM DATE 6/1/78

PROJECT FEATURE \_\_\_\_\_ NAME \_\_\_\_\_

DISCIPLINE \_\_\_\_\_ NAME \_\_\_\_\_

## OUTLET WORKS - OUTLET STRUCTURE AND

OUTLET CHANNEL : SPILLWAY CHUTE

General Condition of Concrete Generally in good condition except noted below

Rust or Staining None observed

Spalling Minor spalling

Erosion or Cavitation Substantial erosion of concrete at contact between walls & floor.

Visible Reinforcing None observed

Any Seepage or Efflorescence None observed

Condition at Joints lower monolith of the chute has settled non-uniformly, 4" on South wall and floor and 1" on North wall and floor with downstream separation of approximately 2". upper monolith of the chute has separated from bed culvert about 1/2" downstream

Drain Holes None

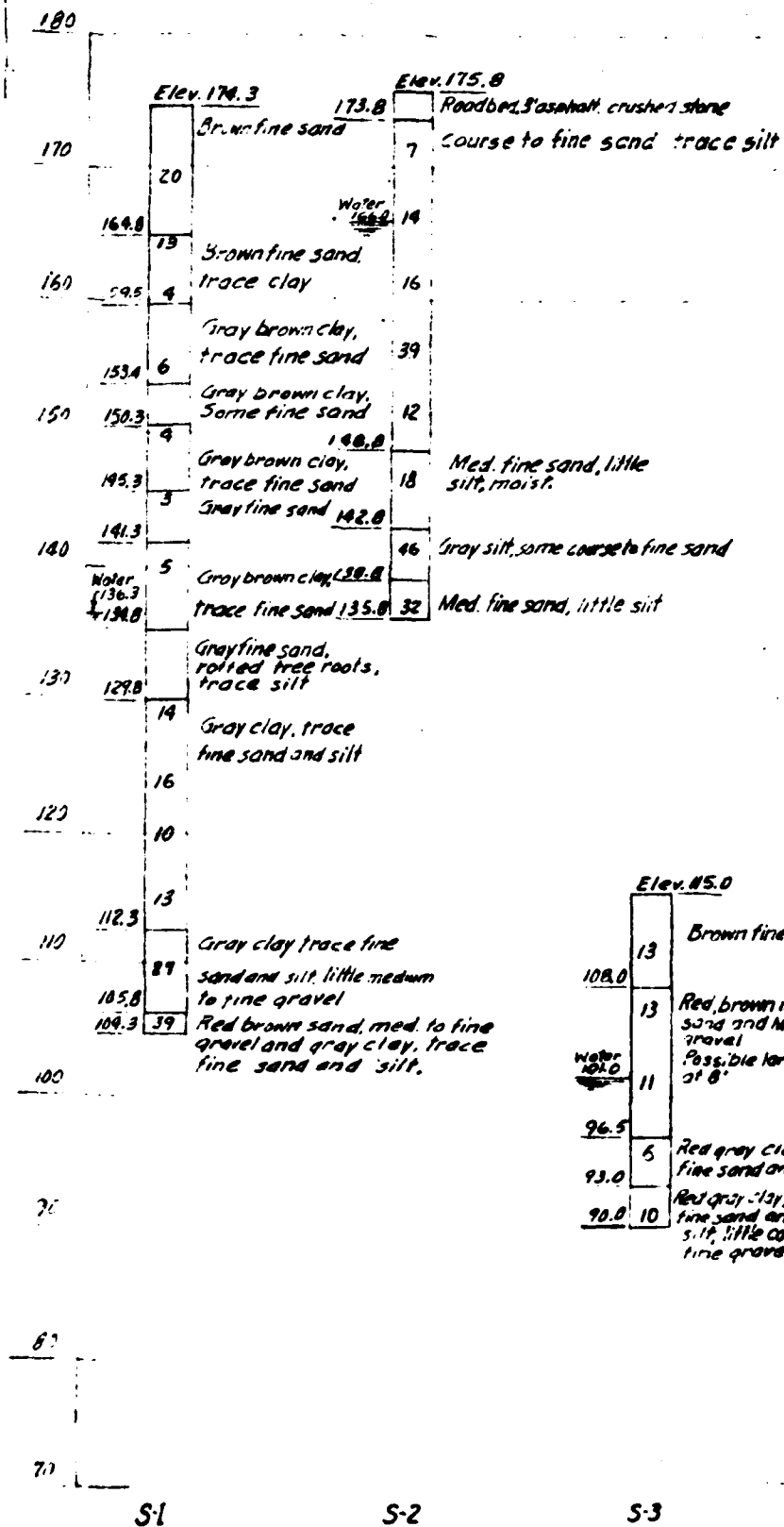
Channel Downstream channel flows into lower pond of Van Horn Park.

Loose Rock or Trees Overhanging Channel \_\_\_\_\_

Condition of Discharge Channel Riprap at the end of the chute have been displaced towards the pond. Partial blockage with debris.

DRAWINGS AND INSPECTION REPORTS

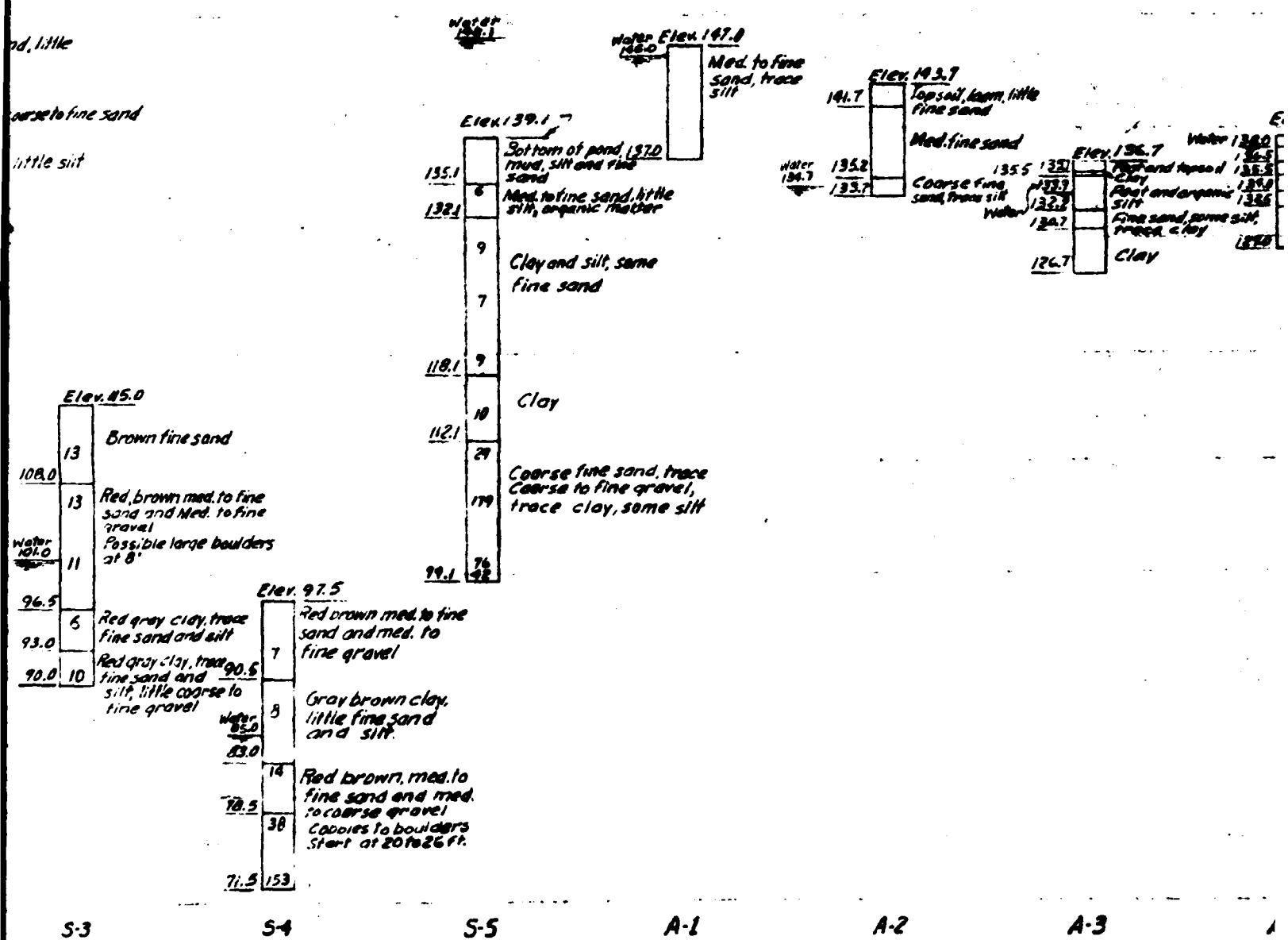
APPENDIX B



S-1                      S-2                      S-3                      S-4

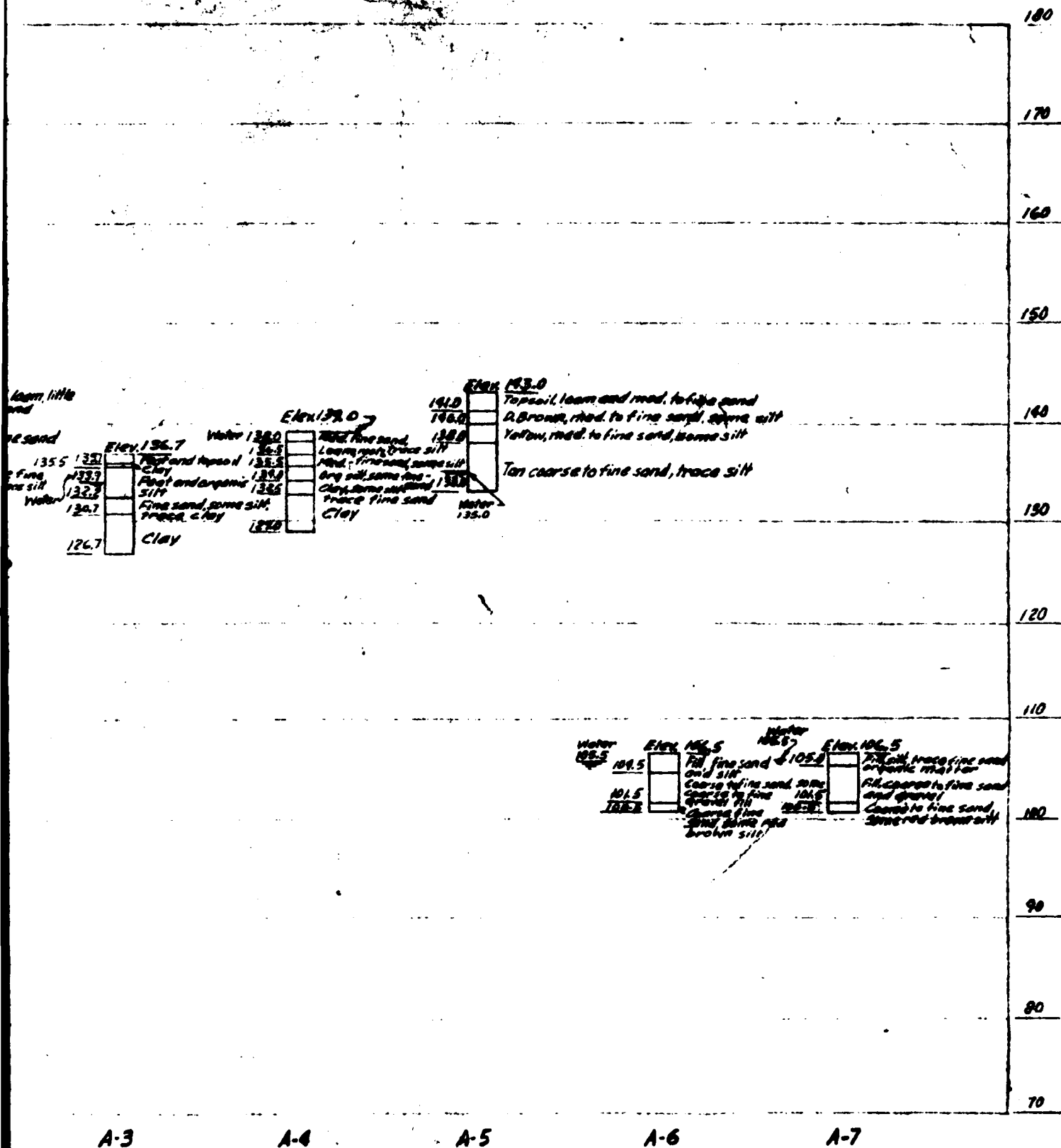
crusher stone  
sand trace silt

little  
coarse to fine sand  
little silt



BORING DATA  
January 1957

"S" denotes wash by  
"K" denotes auger b  
See sh. 183 of 6 to



A-3

A-4

A-5

A-6

A-7

"S" denotes wash boring.  
 "K" denotes auger boring.  
 See sh. 183 of B for locations, shown thus - ●

4

180

170

160

150

140

130

120

110

100

90

80

70

106.5  
2.5 ft. from fine sand  
and gravel  
All coarse to fine sand  
and gravel  
Coarse to fine sand  
Some red brown silt

Note:

gravel and gray clay, trace fine sand and silt.

100

90

80

70

S1

S2

S3

S4

Water 105.0

11

96.5

6

93.0

90.0

10

Sand and med. to fine gravel  
Possible large boulders at 8'

Red gray clay, trace fine sand and silt  
Red gray clay, trace fine sand and silt, little coarse to fine gravel

Elev. 97.5

Red brown med. sand and med. fine gravel

Gray brown c. little fine sand and silt

Red brown, n. fine sand and med. to coarse gr. cobbles to boulders at 20 ft

Water 85.0

83.0

78.5

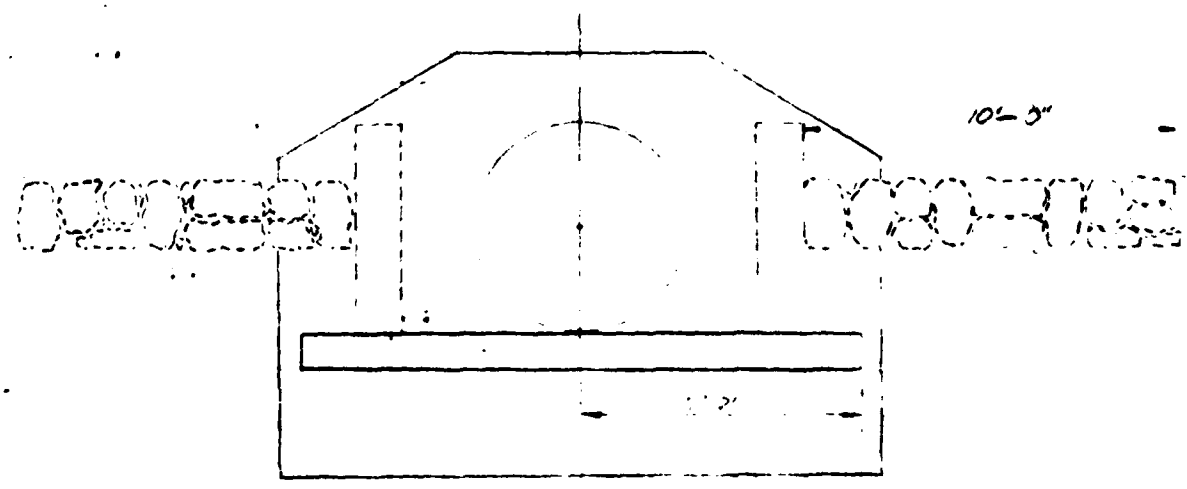
71.5

5

14

38

153



ELEVATION-SHOWING RIPRAP

ENDWALL  
SCA

5

1

|                       |  |      |    |
|-----------------------|--|------|----|
| Elev. 97.5            |  | 14.1 | 42 |
| trace silt            |  |      |    |
| trace 90.5            |  |      |    |
| nd coarse to          |  |      |    |
| sl                    |  |      |    |
| Water                 |  |      |    |
| 83.0                  |  |      |    |
| 83.0                  |  |      |    |
| 14                    |  |      |    |
| Red brown, med. to    |  |      |    |
| fine sand and med.    |  |      |    |
| to coarse gravel      |  |      |    |
| 38                    |  |      |    |
| Cobbles to boulders   |  |      |    |
| Start at 20 to 26 ft. |  |      |    |
| 71.5                  |  |      |    |
| 153                   |  |      |    |

S-4

S-5

A-1

A-2

A-3

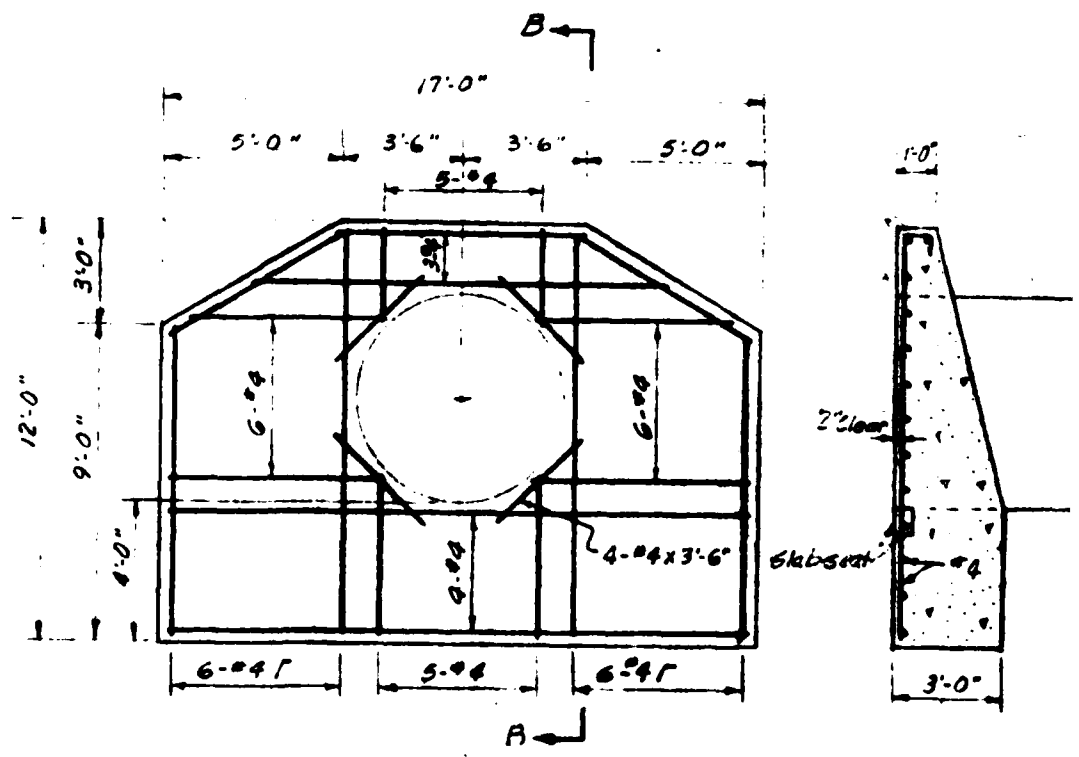
A-4

BORING DATA  
January 1957

"S" denotes wash boring.  
"K" denotes auger boring.  
See sheet 3 of 6 for locations shown

10'-0"

COPIED

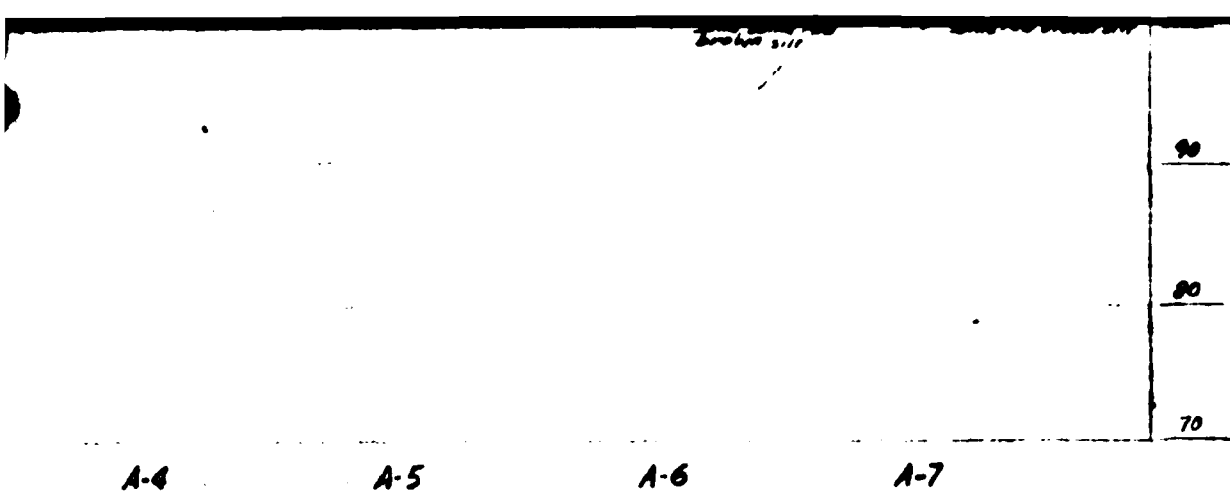


ELEVATION - SHOWING REINFORCING

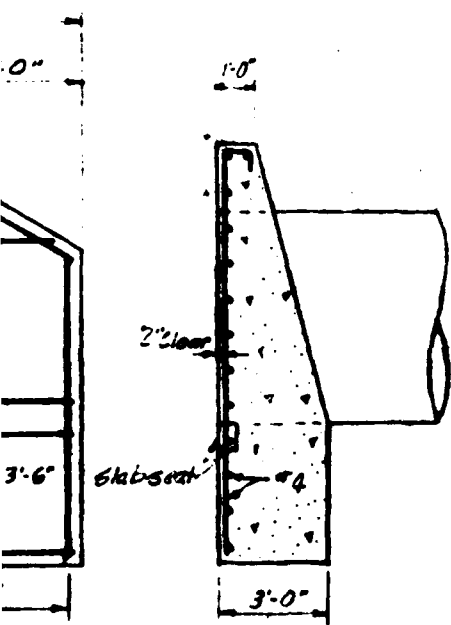
SECTION B-E  
Scale: 1/4" = 1'-0"

ENDWALL AT STA. 3+01.58  
Scale: 1/4" = 1'-0"

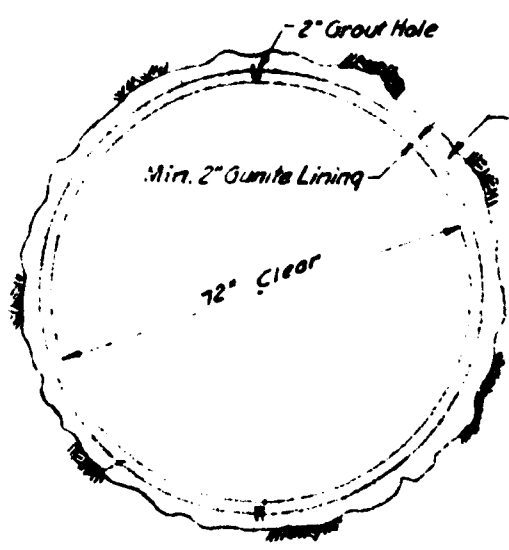




wash boring,  
 s auger boring.  
 13 of 2 for locations, shown thus - ●



**SECTION B-B**  
 Scale:  $\frac{1}{4}$ " = 1'-0"



**TYPICAL SECTION**  
 Lower Pond Outlet Conduit in Tunnelled Section  
 Scale:  $\frac{1}{2}$ " = 1'-0"

Steel conduit. Liner  
 R or Jacked prefabricated  
 pipe.  
 5 gage for over 20' cover  
 10 gage for under 20' cover

PCING

90

80

70

Note:

For General Notes see Sheet No. 3 of 8

Voids outside conduit  
pressure grouted full

Steel conduit-Liner  
R or Jacked prefabricated  
pipe.

5 gage for over 20' cover  
10 gage for under 20' cover

TION  
in Tunnelled Section  
0"

PROPOSED OUTLET WORKS  
VAN HORN PARK  
SPRINGFIELD, MASS.  
DEPARTMENT OF PUBLIC WORKS OF MASSACHUSETTS  
DIVISION OF WATERWAYS

BORINGS &  
MISCELLANEOUS DETAILS

SHEET  
& OF



GREEN ENGINEERING AFFILIATES, INC.  
ENGINEERS BOSTON

DESIGNED: PC  
DRAWN: ELS  
CHECKED: JRN

SCALE: AS SHOWN  
DATE: MARCH, 1957  
CONTRACT NO. 1743

*Robert B. M. J.*  
CHIEF WATERWAYS ENGINEER  
ACC. 036847

8

To Pt. "G" Sta. 6+04.51

$$\begin{aligned} \Delta &= 66^{\circ} 58' 00'' \\ R &= 204.95' \\ D &= 27^{\circ} 57' 22'' \\ T &= 135.57' \\ L &= 239.54' \end{aligned}$$

- Existing toe  
of Slope

4 PROPOSED LOWER  
POND OUTLET

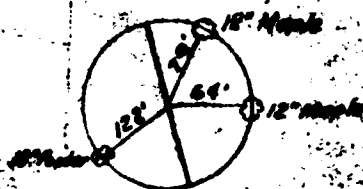
**PROPOSED  
STILLING BASIN**

Pt. F

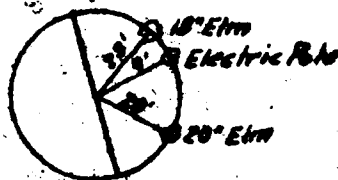


Note: Existing gas and water lines in Armary St. to be lowered by others.

To P.M. - 8.9x943.28



Ties Sta. 4+00  
@ I.H.



Ties Sta. 2+00  
@ I.H.

Upper Pond - Watershed Area - 0.41 Sq. mi.  
Pond Area - 0.015 Sq. mi.  
Storage Available -  $\pm 2.5 \times 10^6$   
Maximum discharge - 730 c.f.s.  
Lower Pond - Watershed Area (Total) - 0.50 Sq. mi.  
Pond Area (Lower pond)  
w.t. at elev. 146.5 - 0.009 Sq. mi.  
w.t. at elev. 168.0 - 0.023 Sq. mi.  
Storage below elev. 168.0 - 39,210 cu ft.  
Max. orifice discharge  
w.t. at elev. 168.0 = 70 c.f.s.  
Max. Tower discharge =  $\pm 900$  c.f.s.  
Storm sewer total capacity -  $\pm 185$  c.f.s.

POND

(Vernon Park)  
Dirt Rd. Park  
Forest Park  
Springfield

PROPOSED  
UPPER POND  
OUTLET

water  
to be  
rs.

To P.A.N. 8.5x9.43.26

B.M. Spire in 15° E 170  
34° 1 Rt. 314 4+55±  
Elev. 178.05

ARMORY ST.

Pine Grove  
6' to 15'

Dirt Rd.

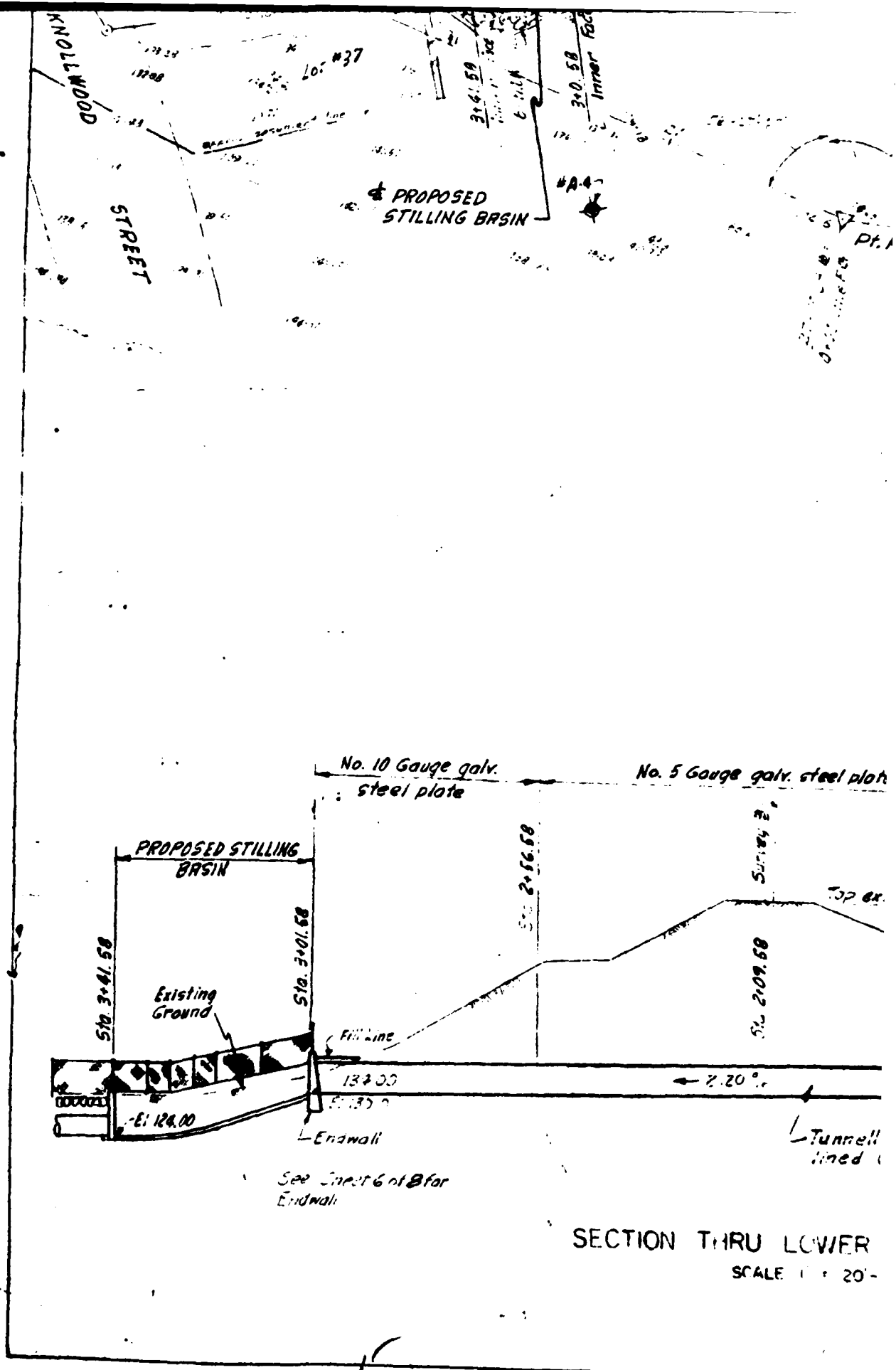
Existing drop pit in barometer  
level line plotted, Dist. 1

(Vernon Park)  
Dist. 22 Parks and  
Forest Park  
Springfield, Mass.

2 PROPOSED  
UPPER POND  
OUTLET

USDA

Survey 87



SECTION THRU LOWER  
SCALE 1" = 20'

5

A





Probable high water level  
one time El. 150.91

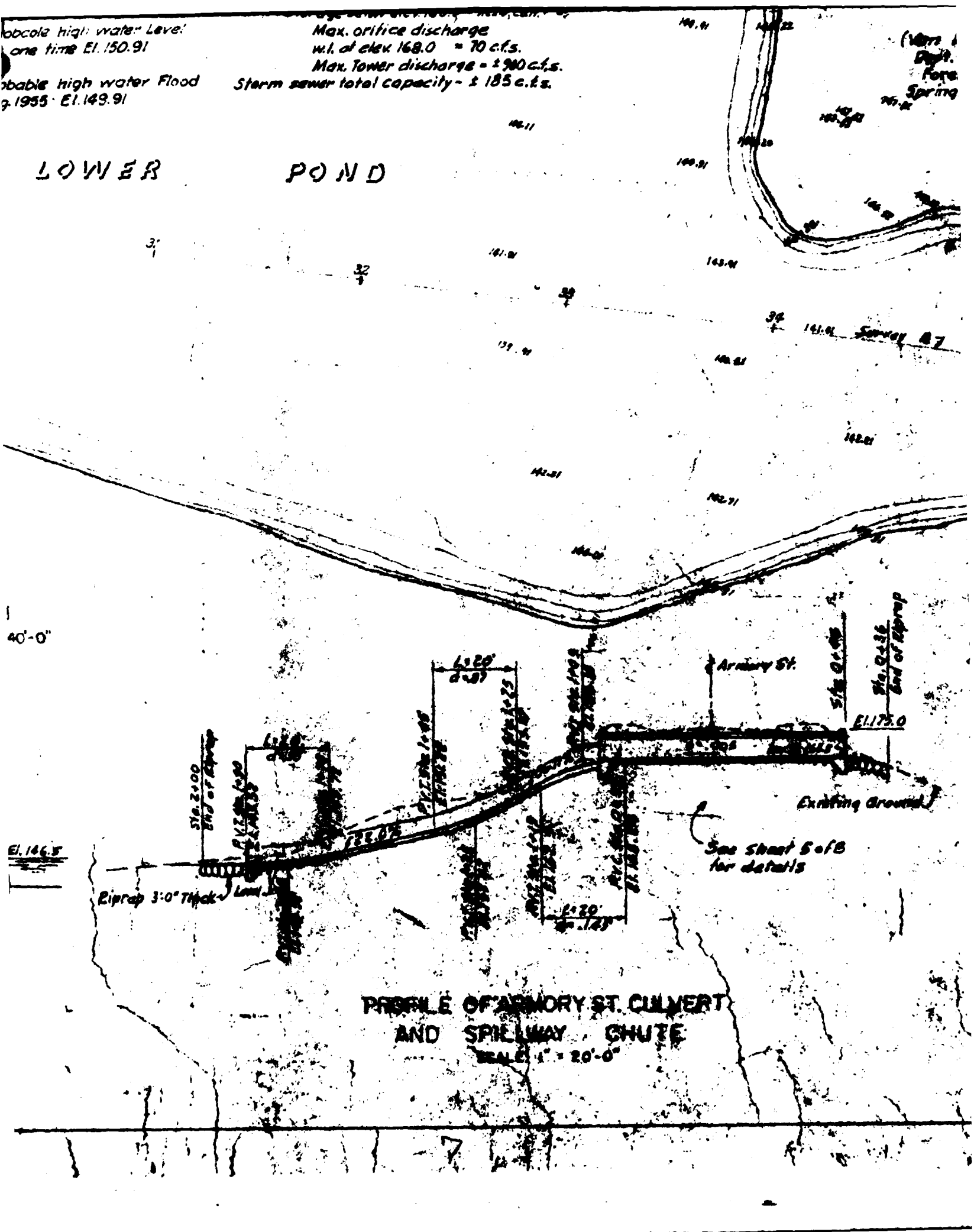
Probable high water Flood  
9, 1955 El. 149.91

Max. orifice discharge  
w.l. of elev 168.0 = 70 c.f.s.

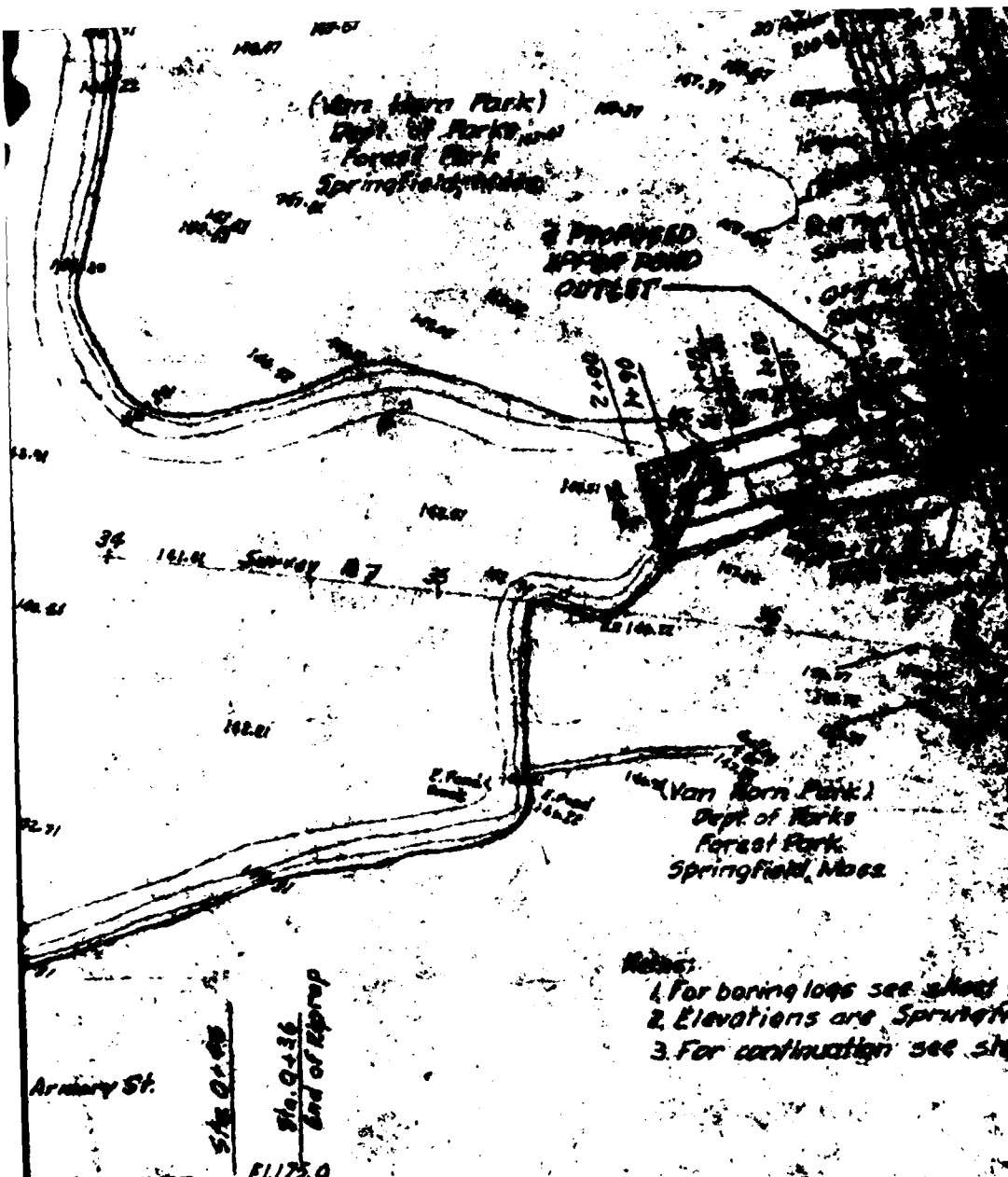
Max. Tower discharge = 190 c.f.s.

Storm sewer total capacity = 185 c.f.s.

# LOWER POND



PROFILE OF ARMORY ST. CULVERT  
AND SPILLWAY CHUTE  
SCALE 1" = 20'-0"



- Notes:
1. For boring logs see sheet 6 of 8.
  2. Elevations are Springfield datum.
  3. For continuation see sheet 7 of 8.

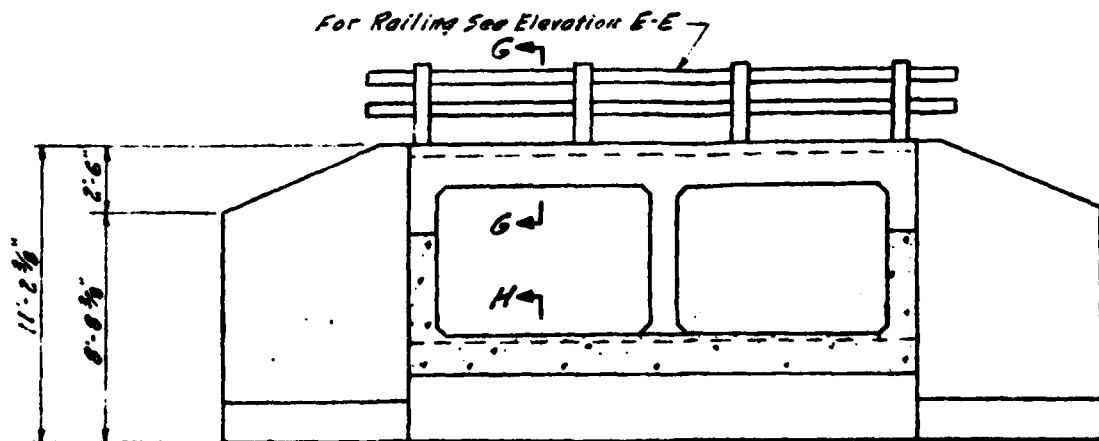
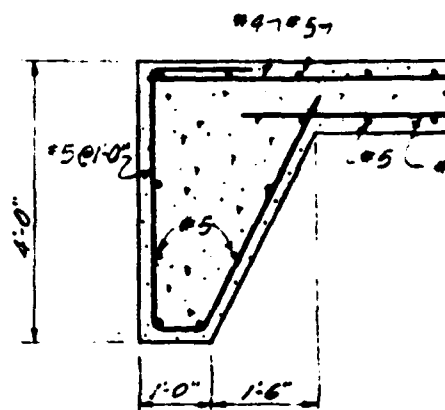
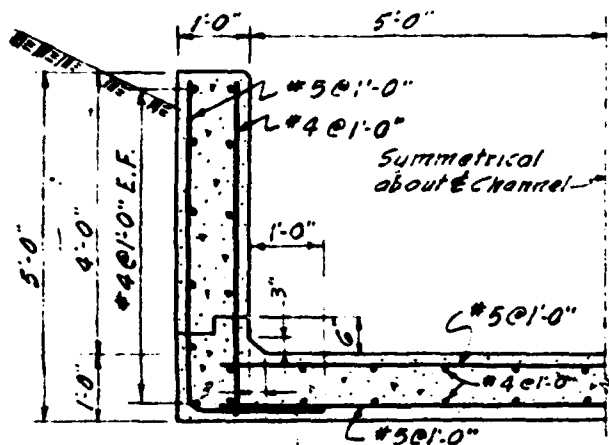
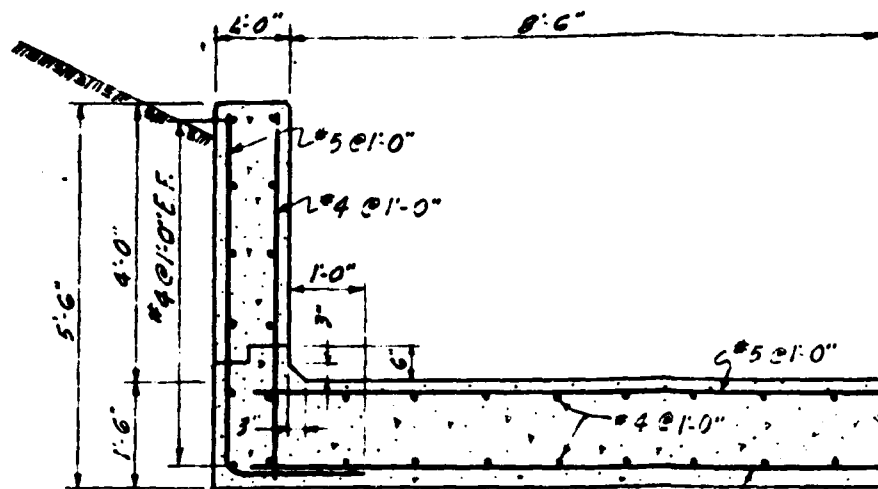
**PROPOSED OUTLET WORKS**  
**VAN HORN PARK**  
**SPRINGFIELD, MASS.**  
**DEPARTMENT OF PUBLIC WORKS OF MASSACHUSETTS**  
**DIVISION OF WATERWAYS**

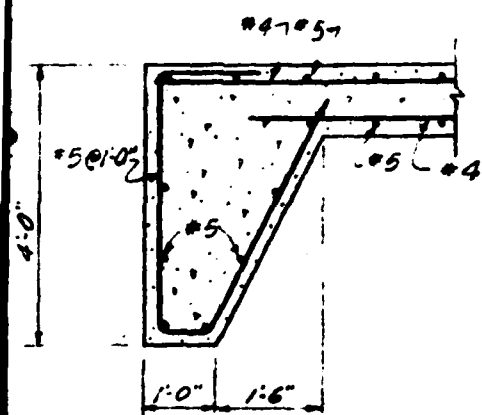
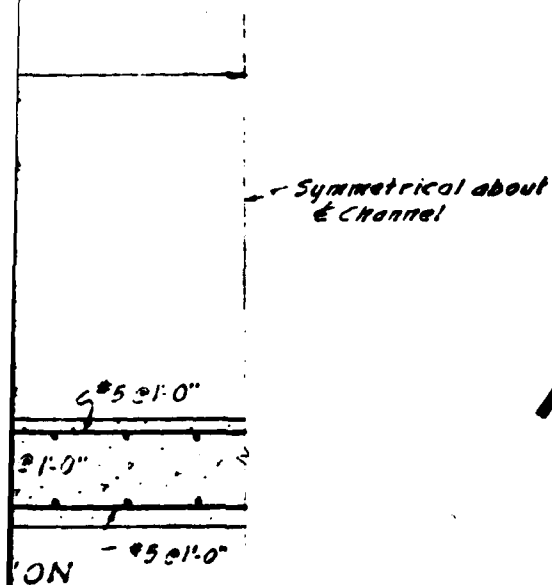
**PLAN AND DETAILS**



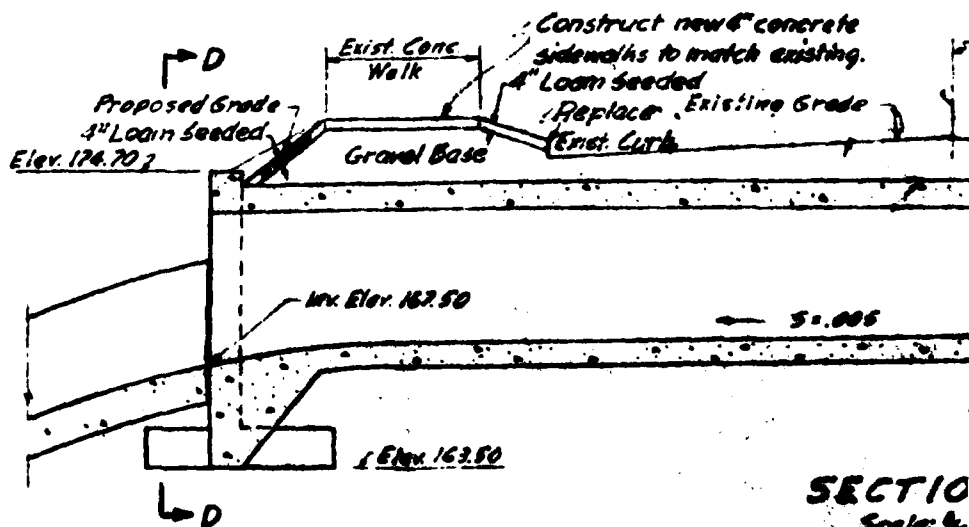
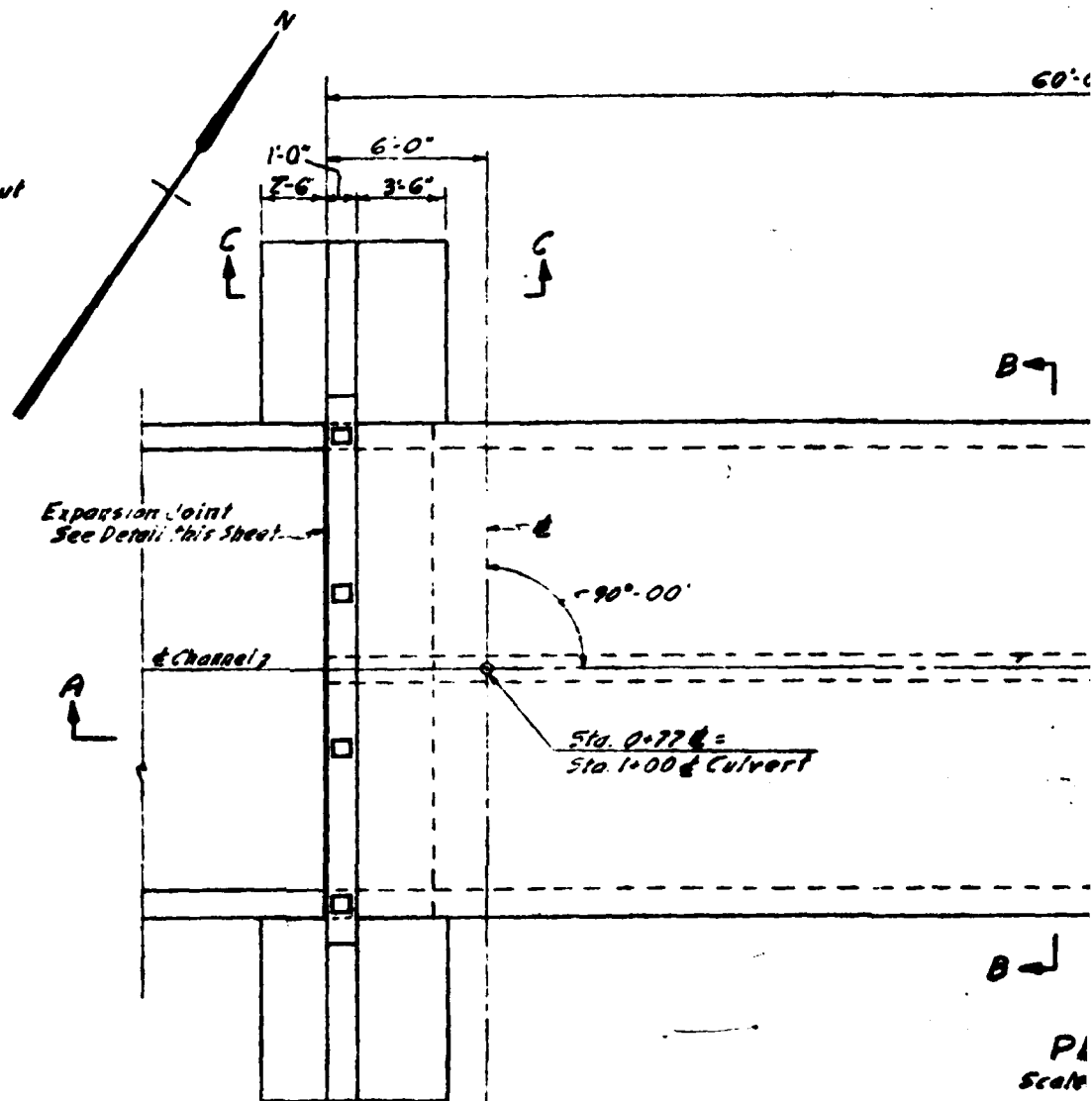
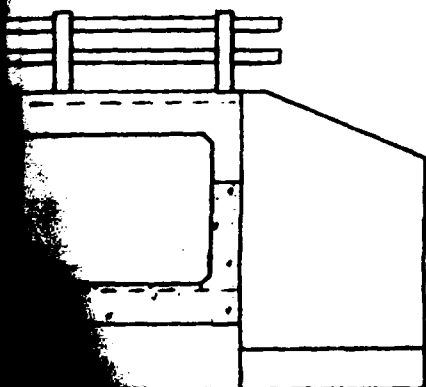
| GREEN ENGINEERING AFFILIATES |                       |
|------------------------------|-----------------------|
| ENGINEERS                    |                       |
| DESIGNED BY: J. J. [Name]    | CHECKED BY: [Name]    |
| DRAWN BY: [Name]             | APPROVED BY: [Name]   |
| DATE: [Date]                 | CONTRACT NO. [Number] |

247-153





SECTION M-M  
Scale:  $\frac{1}{2}$ " = 1'-0"



See Conc. Post 1



60'-0"

30'-0"

3'-6"

1'-0"

2'-6"

B

Construction Joint  
See Detail This Sheet

Culvert

6'-0"

9'-0"

1'-0"

9'-6"

1'-0"

9'-6"

22'-0"

6'-0"

9'-6"

PLAN  
Scale:  $\frac{1}{4}" = 1'-0"$

Construct new 4" concrete  
sidewalks to match existing.  
4" Loom Seeded  
Replace Existing Grade  
Inst. Curb

& Armory St.

Construct new 4" concrete  
sidewalks to match existing  
4" Loom Seeded

4" Conc.  
Walk

Gravel Base

Proposed Grade  
4" Loom Seeded  
4" Conc. 175.00

SECTION A-A  
Scale:  $\frac{1}{4}" = 1'-0"$

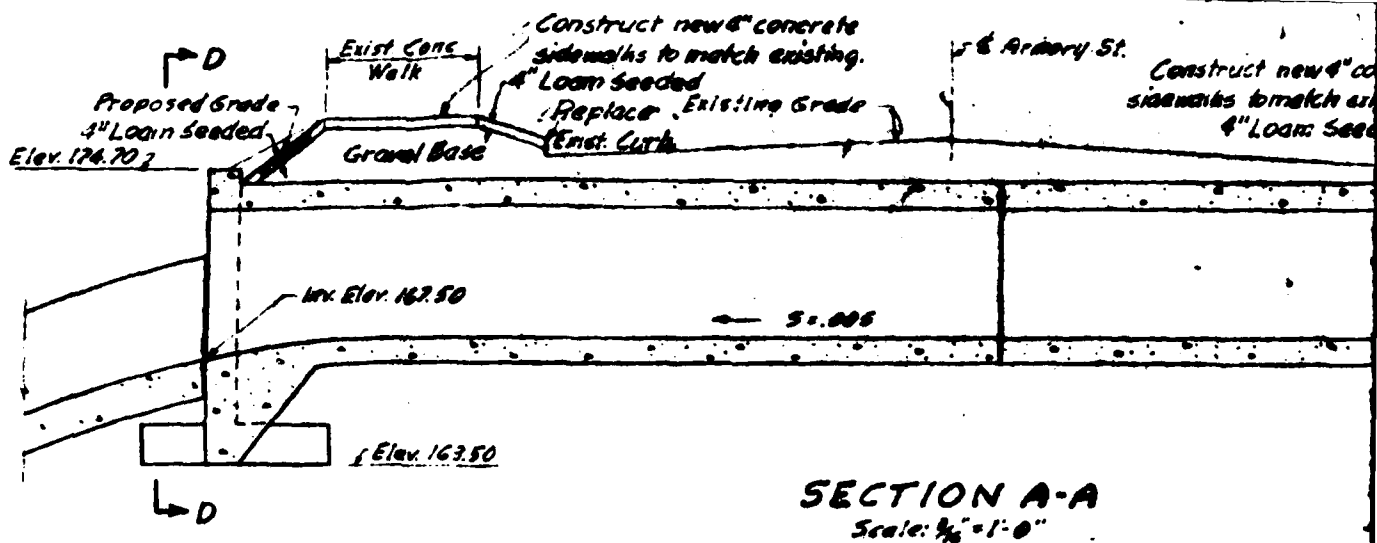
See Conc. Post Detail

$\frac{1}{2}"$  Carriage Bolts

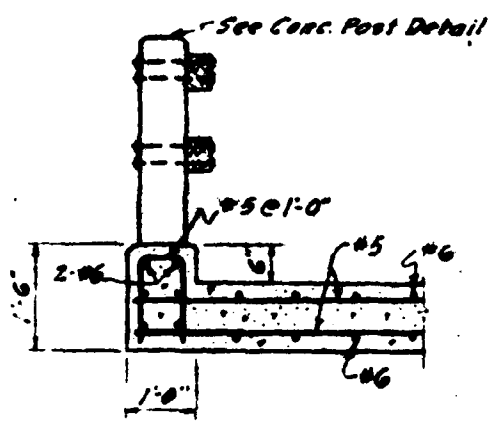
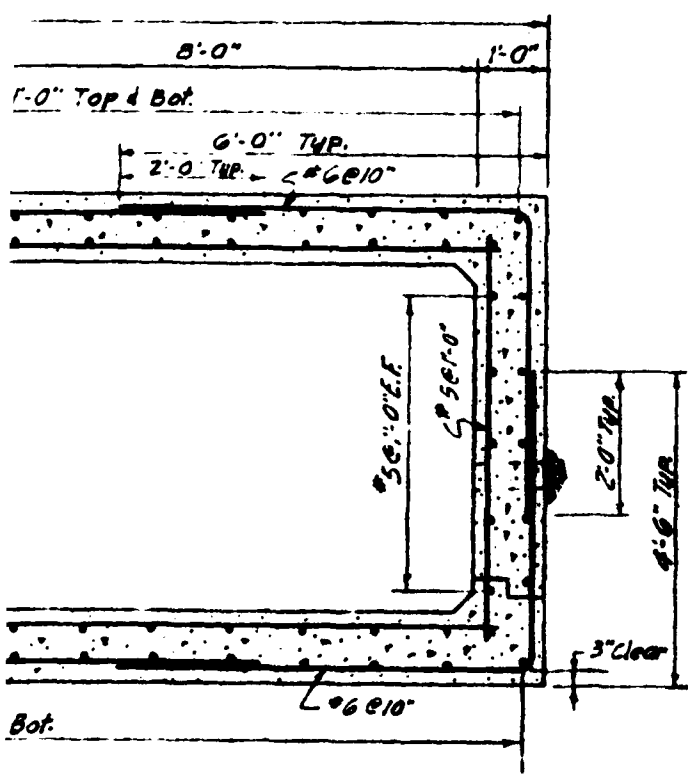
6" Perforated Filter  
Superior Jt.



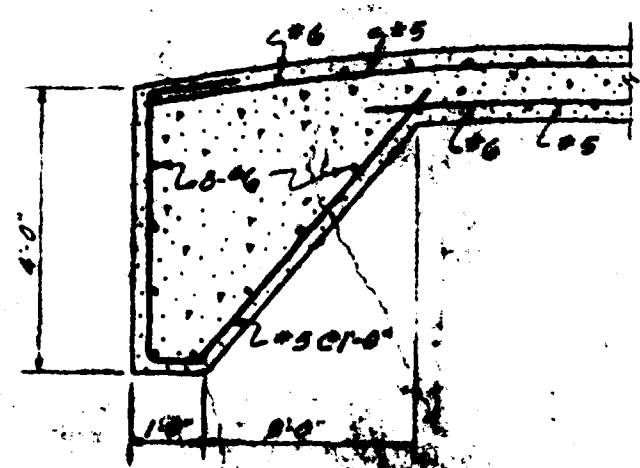




$\frac{3}{8}"$  Carriage Bolts



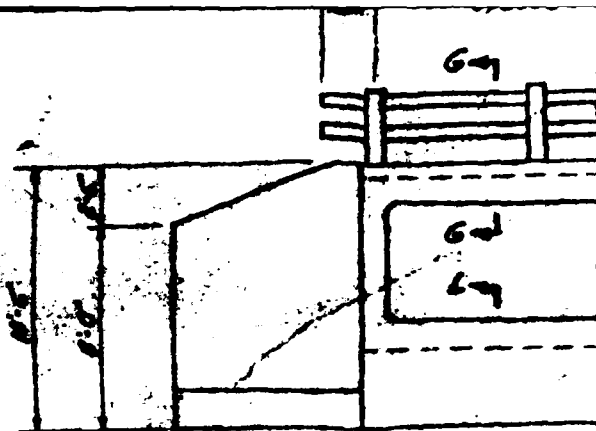
**SECTION G-G**  
Scale:  $\frac{1}{2}" = 1'-0"$



**SECTION H-H**  
Scale:  $\frac{1}{2}" = 1'-0"$

5'-0" Hoops spaced as shown  
 8" Min.  
 CO



[illegible]

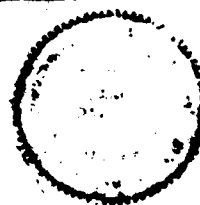
$\frac{1}{2}$ " Precasted Filler  
 Expansion Jt.  
 0" Construction Jt.  
 1 1/2"  
 4"  
 4"  
 Parter

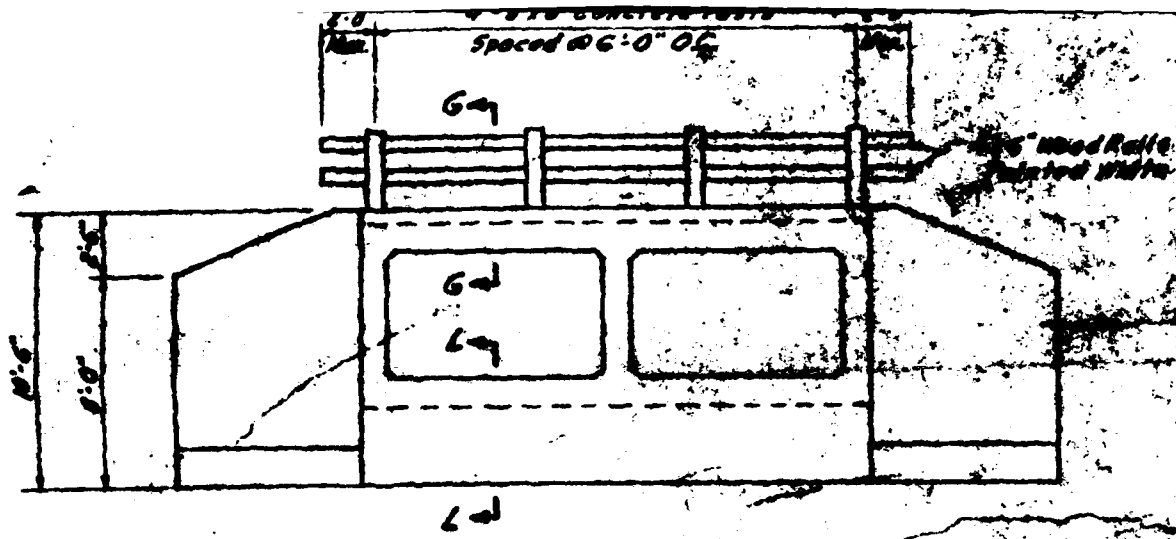
PROPOSE  
VA  
SPRI  
DEPARTMENT OF P  
DIVI

UPPER A

**GREEN  
ENGINE**

DESIGNED: J.K.  
DRAWN: A.J.  
CHECKED: HAK.





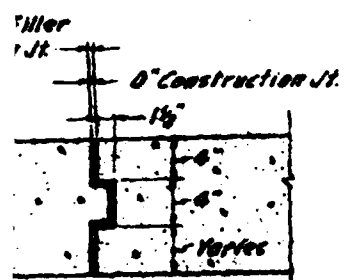
**ELEVATION E-E**  
Scale:  $\frac{1}{8}$ " = 1'-0"

**DESIGN DATA:**

Live Load: H 20 - 44 per A.A.S.H.O. Specifications  
Unit Stresses:  $f_s = 18,000 \text{ lbs./sq. in.}$   
 $f_c = 1,200 \text{ lbs./sq. in.}$   
 $n = 10$

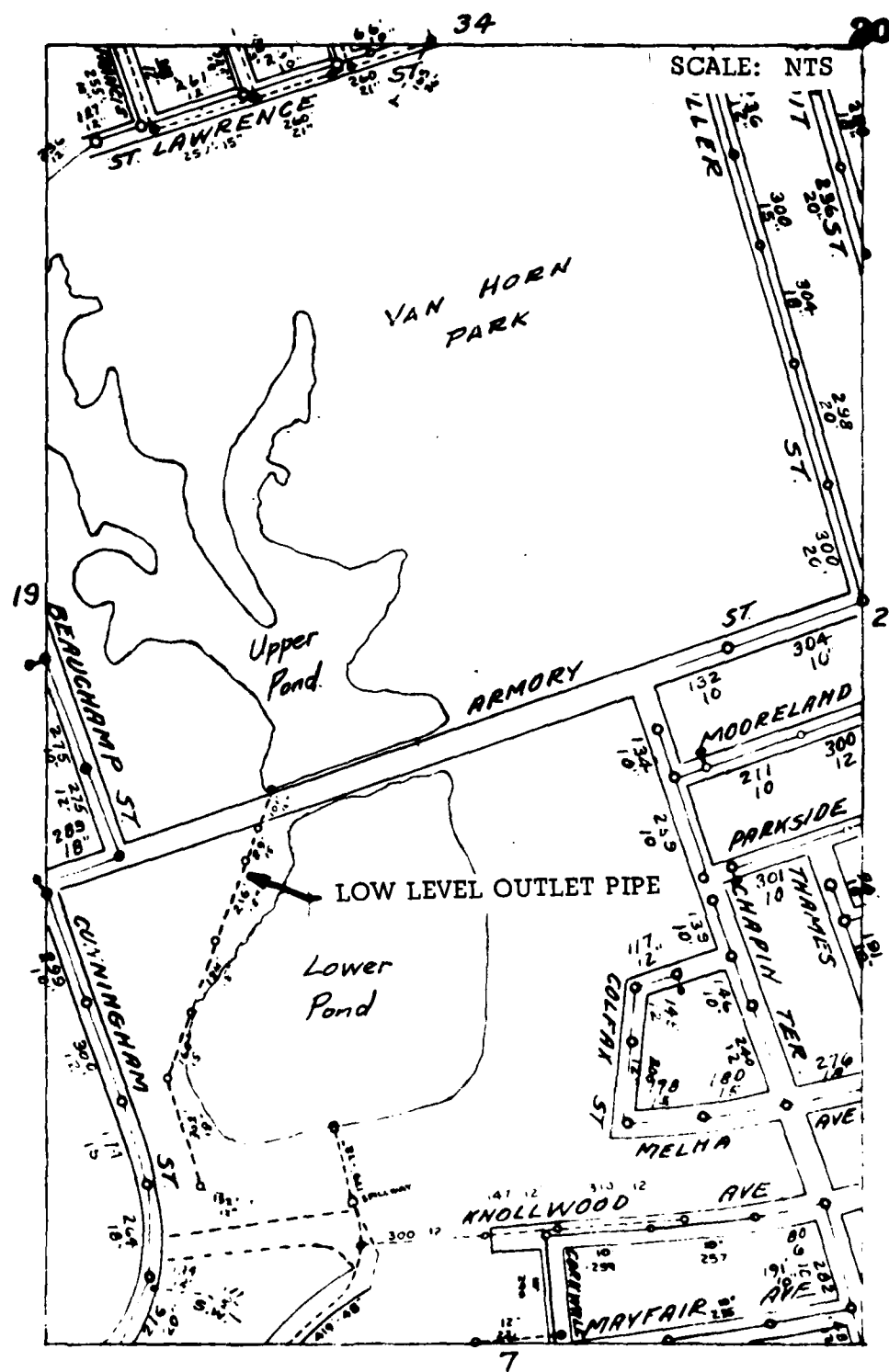
**GENERAL NOTES:**

For Location Plan & Profile of outlet See Sheet No. 3 of 3  
 For location of Section M-M See Sheet No. 3 of 3  
 A: exposed edges of concrete to have a 1x1 bevel unless otherwise noted.  
 For Class of Concrete See Specifications.  
 All steel shall be a minimum of 2" clear from face of concrete unless otherwise noted.  
 Bars shall be lapped a minimum of 36 bar diameter unless otherwise noted.

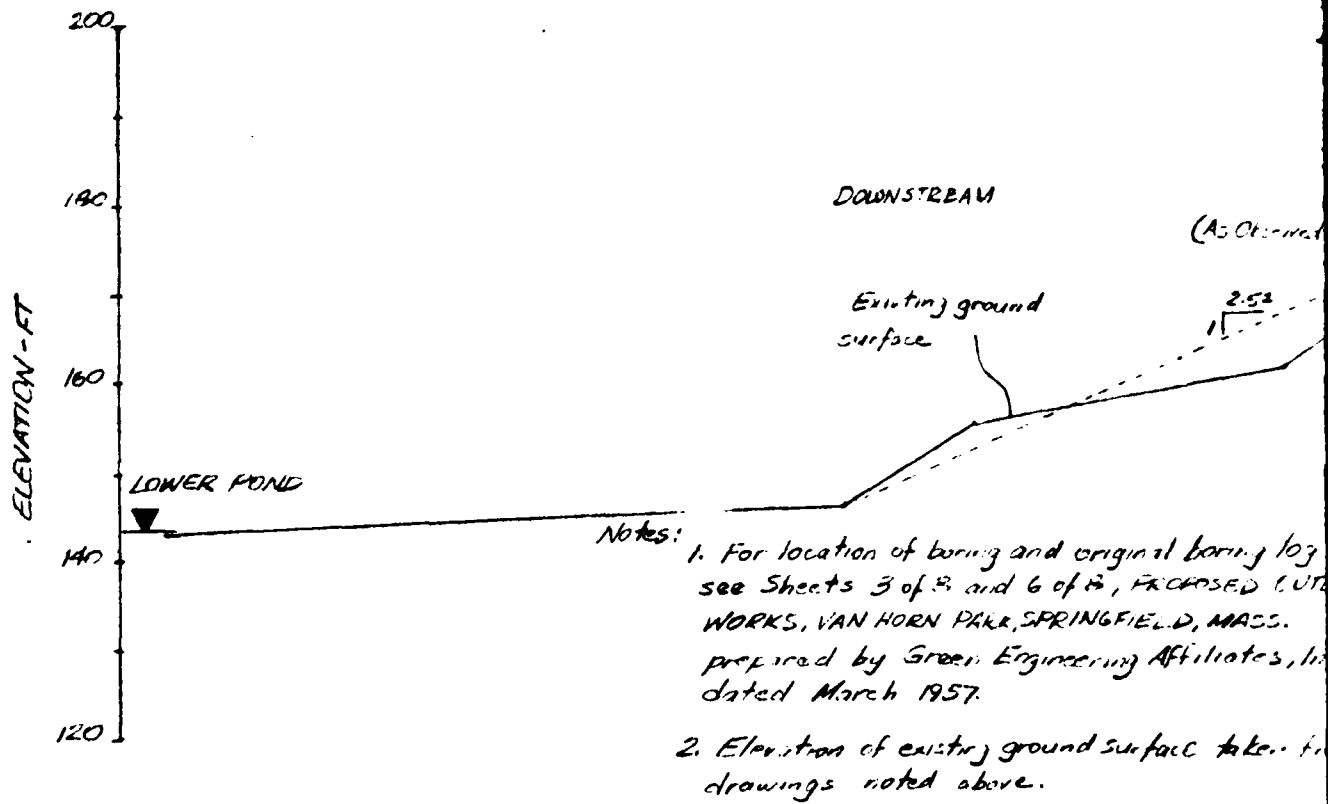


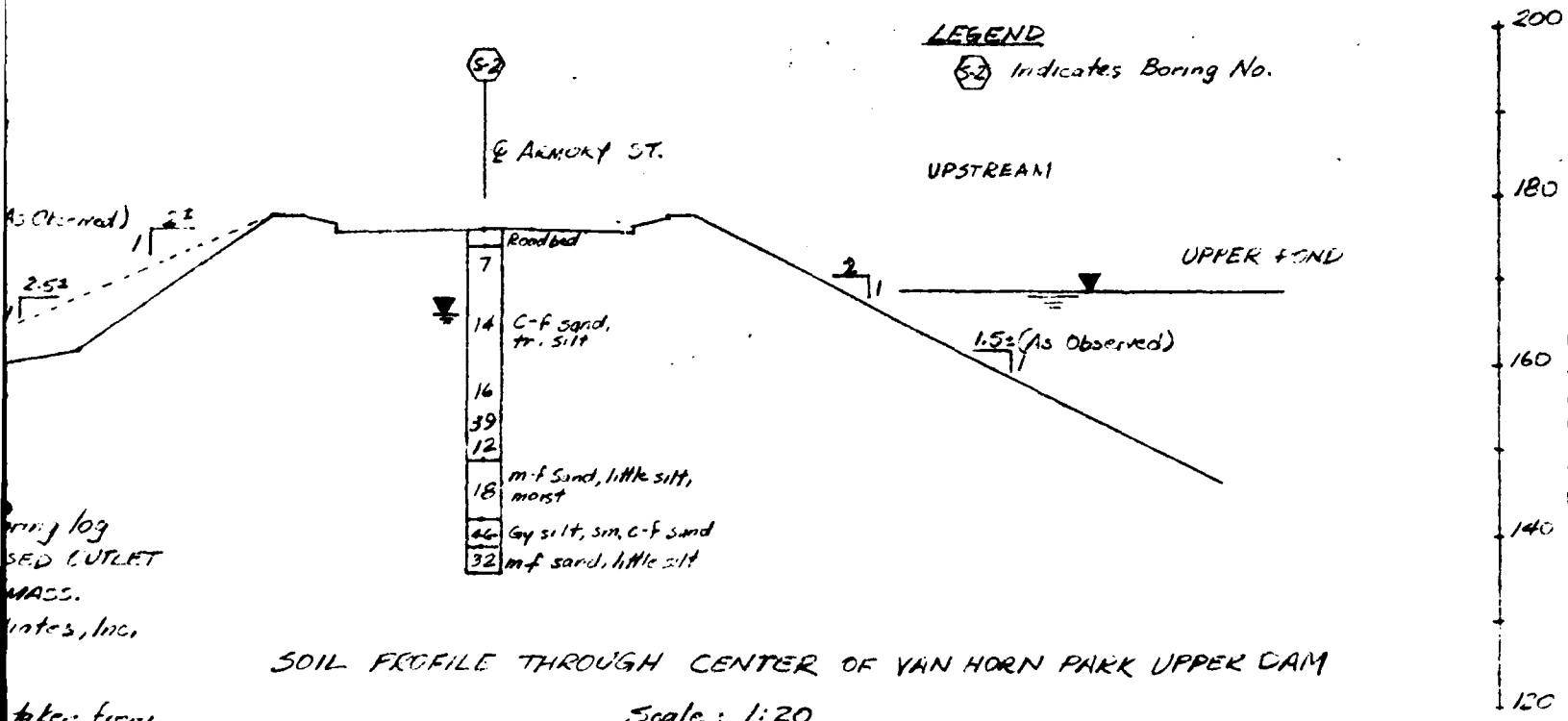
**SECTION M-M EXPANSION JOINT DETAIL**  
Scale: 1" = 1'-0"

|   |   |  |
|---|---|--|
| <b>PROPOSED OUTLET WORKS</b><br><b>VAN HORN PARK</b><br><b>SPRINGFIELD, MASS.</b><br><b>DEPARTMENT OF PUBLIC WORKS OF MASSACHUSETTS</b><br><b>DIVISION OF WATERWAYS</b> |   |  |
| <b>UPPER POND OUTLET</b>  |   | SHEET NO. 3 OF 3<br>1957                                 |
|   | <b>GREEN ENGINEERING ASSOCIATES, INC.</b><br><b>ENGINEERS</b> |  |
|   | <b>BOSTON</b>   |  |
|   | DESIGNED: J.N.<br>DRAWN: A.L.J.<br>CHECKED: H.M.              | SCALE: AS SHOWN<br>DATE: MARCH, 1957<br>CONTRACT NO 1743 |



SEWER AND LOW LEVEL OUTLET PLAN  
VAN HORN PARK UPPER DAM





|   |                                  |
|---|----------------------------------|
| TAMS  | U.S. ARMY ENGR. DIV. NEW ENGLAND |
| BROOKLINE MASS.                                 | CORPS OF ENGINEERS               |
| WALTHAM, MASS                                   |                                  |
| NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS |                                  |
| VAN HORN PARK UPPER DAM                         |                                  |
| SOILS PROFILE                                   |                                  |
| CONNECTICUT RIVER BASIN                         | MASS.                            |
| SCALE: NTS                                      |                                  |
| DATE: JULY 78                                   |                                  |



*The Commonwealth of Massachusetts*

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.  
DIVISION OF WATERWAYS

*100 Nashua Street, Boston 02111*

February 14, 1977

Park Commission  
City of Springfield  
Park Department  
Forest Park Office  
Springfield, Mass.

Re: Insp. Dam #2-7-281-9  
Van Horn Park - Upper Dam  
Springfield

Gentlemen:

On March 22, 1976, an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be the City of Springfield. If this information is incorrect, will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is conditionally safe. The following conditions were noted that require attention:

SEE REVERSE SIDE OF SHEET FOR

"REMARKS AND RECOMMENDATIONS"

We call these conditions to your attention before they become serious and more expensive to correct. With any correspondence please include the number of the dam as indicated above.

Very truly yours,

John F. Hannon, P.E.  
Chief Engineer

1978

AL: CC: F. J. Hoey, D.H.E. Dist. 2  
R. Salls, D.D.E. Dist. 2  
Mayor's Office, City Hall, Springfield  
Conservation Commission, City Hall, Springfield  
✓ File

2-17-77

(OVER)

# INSPECTION REPORT - DAMS AND RESERVOIRS

1.

## LOCATION:

City/Town Springfield County Hampden Dam No 2-7-281-9

Name of Dam Van Horn Park - Upper Dam

Topo Sheet No. 12B Mass. Rect. Coordinates: N 412,200 E 302,800

Inspected by: Harold T. Shumway, On 3/22/76 Date 4/22/74 Last Inspection

2.

OWNER/S: As of March 22, 1976

per: Assessors \_\_\_\_\_, Reg. of Deeds \_\_\_\_\_, Prev. Insp. X, Per. Contact X

Park Commission

1. City of Springfield, Park Dept. Forest Park Office, Springfield, Mass.

Name \_\_\_\_\_ St. & No. \_\_\_\_\_ City/Town \_\_\_\_\_ State \_\_\_\_\_ Tel. No. \_\_\_\_\_

2. \_\_\_\_\_

Name \_\_\_\_\_ St. & No. \_\_\_\_\_ City/Town \_\_\_\_\_ State \_\_\_\_\_ Tel. No. \_\_\_\_\_

3. \_\_\_\_\_

Name \_\_\_\_\_ St. & No. \_\_\_\_\_ City/Town \_\_\_\_\_ State \_\_\_\_\_ Tel. No. \_\_\_\_\_

3.

CARETAKER: (if any) e.g. superintendent, plant manager, appointed by  
absentee owner, appointed by multi owners.

Mr. Albert Poehler

Dep.Supt. for Maintenance, Park Dept., Forest Park Office, Springfield

Name \_\_\_\_\_ St. & No. \_\_\_\_\_ City/Town \_\_\_\_\_ State \_\_\_\_\_ Tel. No. \_\_\_\_\_

4.

## DATA:

No. of Pictures Taken None Sketches See description of Dam.

Plans, Where In Division of Waterways-Boston-Plans for Contract #1743

dated March 1957, ACC 036848A

5.

DEGREE OF HAZARD: (if dam should fail completely)\*

1. Minor \_\_\_\_\_ 3. Severe \_\_\_\_\_

2. Moderate \_\_\_\_\_ 4. Disastrous X

Comments: Approx. 35 Million gallons impoundment. Densely populated area downstream if Lower Dam No. 2-7-281-10 should fail simultaneousl

\*This rating may change as land use changes (future development).

6.

## OUTLETS: OUTLET CONTROLS AND DRAWDOWN

Near south end of embankment-two 8'x5' conc. box  
 No. 1 Location and Type: culverts-invert 7' below top of embankment.

Controls None, TYPE: \_\_\_\_\_

Automatic \_\_\_\_\_. Manual \_\_\_\_\_. Operative Yes \_\_\_\_\_, No \_\_\_\_\_.

Comments: Spalled area on the roof of both culverts. A bolted metal clamp

Downstream end of conc. box culverts. over area.  
 No. 2 Location and Type: Conc. chute spillway-17' wide-narrows to 10'-4' high  
sidewalls drops 22.7'.

Controls None, Type: \_\_\_\_\_

Automatic \_\_\_\_\_. Manual \_\_\_\_\_. Operative Yes \_\_\_\_\_, No \_\_\_\_\_.

Lower 20'+ of conc. chute has settled 3" below rest of  
 Comments: structure and moved downstream 1" to 2" leaving open seam at  
construction joints - particularly on floor of chuted.

No. 3 Location and Type: \_\_\_\_\_

Controls \_\_\_\_\_, Type: \_\_\_\_\_

Automatic \_\_\_\_\_. Manual \_\_\_\_\_. Operative Yes \_\_\_\_\_, No \_\_\_\_\_.

Comments: \_\_\_\_\_

Drawdown present Yes \_\_\_\_\_, No X. Operative Yes \_\_\_\_\_, No \_\_\_\_\_.

Comments: No drawdown shown on plans or located in field.

7.

DAM UPSTREAM FACE: Slope 1:1, Depth Water at Dam 15'+.

Material: Turf X. Brush & Trees X. Rock fill \_\_\_\_\_. Conc. X  
 Masonry X. Wood \_\_\_\_\_.  
 Culverts \_\_\_\_\_

Other \_\_\_\_\_

Condition: 1. Good \_\_\_\_\_. 3. Major Repairs \_\_\_\_\_

2. Minor Repairs X. 4. Urgent Repairs \_\_\_\_\_

Comments: Grade of Embankment very irregular-minor brush growth -  
scattered 6" to 10" trees. Minor spalling of concrete culverts.

8.

DAM DOWNSTREAM FACE: Slope 1:1.

Material: Turf X. Brush & Trees \_\_\_\_\_. Rock Fill \_\_\_\_\_. Conc. X  
 Masonry X. Wood \_\_\_\_\_.  
 Spillway  
 Chute  
 Other \_\_\_\_\_

Condition: 1. Good \_\_\_\_\_. 3. Major Repairs X.

2. Minor Repairs \_\_\_\_\_. 4. Urgent Repairs \_\_\_\_\_

Comments: Brush, trees, seepage, piping, structural movement, washouts,  
and general erosion of slope. See remarks



9. EMERGENCY SPILLWAY: Available No. Needed No.

Height Above Normal Water:            Ft.

Width            Ft. Height            Ft. Material           .

Condition: 1. Good           . 3. Major Repairs           .

2. Minor Repairs           . 4. Urgent Repairs           .

Comments: Capacity of outlet structure appears adequate for run-off  
from small drainage area.

10. WATER LEVEL AT TIME OF INSPECTION: 7½ Ft. Above           . Below X.

Top Dam X F.L. Principal Spillway           .

Other           .

Normal Freeboard 8+ Ft.

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Yes-minor brush growth-6" to 10" trees  
upstream slope. minor brush, numerous tree.

Animal Burrows and Washouts Yes, several small gullies on both slopes. Three  
large washed gullies on downstream slope.

Damage to Slopes or Top of Dam Yes-see above-also evidence of pavement  
settlement on top of dam.

Cracked or Damaged Masonry Yes-see item #6 sub 1 and sub 2.

Evidence of Seepage Yes-several areas of seepage noted along toe of slope.

Evidence of Piping Yes-approx 30' south of outlet end of culvert chute, near  
toe of slope-large boil area-1½' deep-fines evident.

Leaks Yes-see above.

Erosion Yes-surface erosion general on both slopes.

Trash and/or Debris Impeding Flow None found.

Clogged or Blocked Spillway None found.

Other A 2'x2' cast iron shell (catch basin type) noted at northerly end of  
dam at upstream toe of slope. Probing with a stick showed a depth of  
18" to an apparent solid floor. Receptacle filled with silt and  
leaves-a slight water flow into this shell was noted. No evidence  
of any outlet on downstream slope could be found.

12

OVERALL CONDITION:

1. Safe \_\_\_\_\_.
2. Minor repairs needed \_\_\_\_\_.
3. Conditionally safe - major repairs needed   X   \_\_\_\_\_.
4. Unsafe \_\_\_\_\_.
5. Reservoir impoundment no longer exists (explain)  
Recommend removal from inspection list \_\_\_\_\_.

13

REMARKS AND RECOMMENDATIONS: (Fully Explain)

Conditions at this dam have deteriorated further since last inspection of 4/22/74 with no apparent evidence of any repairs or maintenance work on dam since then.

The upstream slope has changed very little since last inspection. The downstream slope has a heavy brush growth, several large trees and general seepage was noted all along toe of slope. Evidence of old washouts was noted along with evidence of a recent washout 65' to 70' south of spillway culverts. This washout has created a large gully which will erode further from surface runoffs. Settlement and movement of lower end of spillway chute has increased slightly since last inspection.

A large boil, 1'+ in diameter and 1½' deep by probing, was noted at toe of slope 30'+ south of outlet ends of culverts. A large flow of water was evident and considerable fines were noted in area of runoff channel from this boil. It was questioned at last inspection if this were a boil or a spring and apparently no investigation has been done by the City of Springfield to answer this question since then.

It would appear that a more adequate program of maintenance is advisable to repair and maintain a safe and sound structure.

HTS:ma

REMARKS AND RECOMMENDATIONS (Fully Explain)

Conditions at this dam have deteriorated further since last inspection of 4/22/74 with no apparent evidence of any repairs or maintenance work on dam since then.

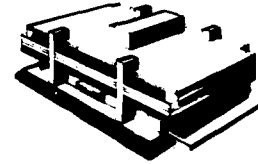
The upstream slope has changed very little since last inspection. The downstream slope has a heavy brush growth, several large trees and general seepage was noted all along toe of slope. Evidence of old washouts was noted along with evidence of a recent washout 65' to 70' south of spillway culverts. This washout has created a large gully which will erode further from surface runoffs. Settlement and movement of lower end of spillway chute has increased slightly since last inspection.

A large boil, 1'± in diameter and 1½" deep by probing, was noted at toe of slope 30"± south of outlet ends of culverts. A large flow of water was evident and considerable fines were noted in area of runoff channel from this boil. It was questioned at last inspection if this were a boil or a spring and apparently no investigation has been done by the City of Springfield to answer this question since then.

It would appear that a more adequate program of maintenance is advisable to repair and maintain a safe and sound structure.



Commonwealth of Massachusetts  
County of Hampden  
Hall of Justice  
50 State Street  
Springfield, Massachusetts 01103



OFFICE OF THE  
COUNTY COMMISSIONERS

STEPHEN A. MOYNAHAN  
CHAIRMAN  
ARMANDO G. DIMAURO  
RICHARD S. THOMAS

May 25, 1978

Dippedds Abbedd McCarthy Draddon  
345 Park Ave.  
New York 10022

Attn: H. Feldmen

Sir:

These are the latest reports available in this office. There is also a record of all previous field studies by Tigh & Bond Consulting Engineers and G.H. McDonnell the former County hydraulic engineer. The only plan I have on file is of the Watershop dam as stated in the enclosed report.

Sincerely,

Frank A. Rueli, Jr.  
Engineer, Hampden County

These are pertinent excerpts from the original letter.



Commonwealth of Massachusetts

# County of Hampden

Springfield, Mass.

Office of the  
County Commissioners  
52 State Street

William J. Stapleton  
Chairman

~~Robert J. Mink~~  
Floyd H. Fradet

Stephen A. Moynahan

December 10, 1969

Springfield Parks Commission  
Public Parks Department  
Forest Park Office  
Springfield, Massachusetts

Gentlemen:

In accordance with the provisions of Chapter 253, Section 45, et seq. of the General Laws, Tercentenary Edition, relative to inspections, condition and safety of dams in Hampden County, you are hereby advised that your Middle Dam located in Forest Park and forming the lower of the two larger ponds, as well as your two dams located at Van Horn Park, have been inspected by our Engineer and your attention is called to the following conditions noted and recommendations made by him as related to the dams.

"Van Horn Park Upper Dam

The embankment forming this dam was found to be in good condition. The toe area was noted to be reasonably dry. There was some erosion on the downstream slope in the vicinity of the spillway and at the outlet from a catchbasin near the toe, not too far distant to the right of the spillway structure. The erosion is not dangerous because of the fact the embankment is very wide in relation to its height.

The lower portion of the spillway chute has settled more at the left side of the upstream end. The joint in the floor of the spillway at this location should be sealed so that water will not flow thru the joint, under the floor, and produce further settlement.

The spillway itself is satisfactory other than the settlement as just mentioned. The toe of the spillway is in satisfactory condition and there is no stream bed erosion.

The road extending along the top of the embankment was in good condition. There was no evidence of cracking or settlement. The culvert extending thru the embankment, and which is a part of the spillway facility, was found to be o.k. There were no stoplogs at the culvert entrance. The culvert was relatively free of debris. There was some sand and gravel on the floor but this does not affect the operation of the culvert.

The wingwalls on each side of the culvert entrance have begun to lean a bit toward the lake. This condition is not dangerous and does not affect the safety of the dam.

In the opinion of the undersigned, the dam is safe. However, the owner should take steps to seal the joint in the floor of the spillway chute at the upper end of the lower section where settlement has been taking place during the last few years."

The work recommended by the County Hydraulic Engineer should be accomplished during the coming year. It is essential that the dams be properly maintained and that personnel of your Department do the needed routine maintenance.

Inspections of these dams will be made again during the summer of 1970 by which time it is anticipated you will have completed the work as recommended by the County Hydraulic Engineer.

Any further information concerning this matter which you may desire will be furnished by this office upon request.

Very truly yours,

BOARD OF COUNTY COMMISSIONERS

---

---

---



The work recommended by the County Hydraulic Engineer should be accomplished during the coming year. It is essential that the dams be properly maintained and that personnel of your Department do the needed routine maintenance.

Inspections of these dams will be made again during the summer of 1970 by which time it is anticipated you will have completed the work as recommended by the County Hydraulic Engineer.

Any further information concerning this matter which you may desire will be furnished by this office upon request.

Very truly yours,

BOARD OF COUNTY COMMISSIONERS

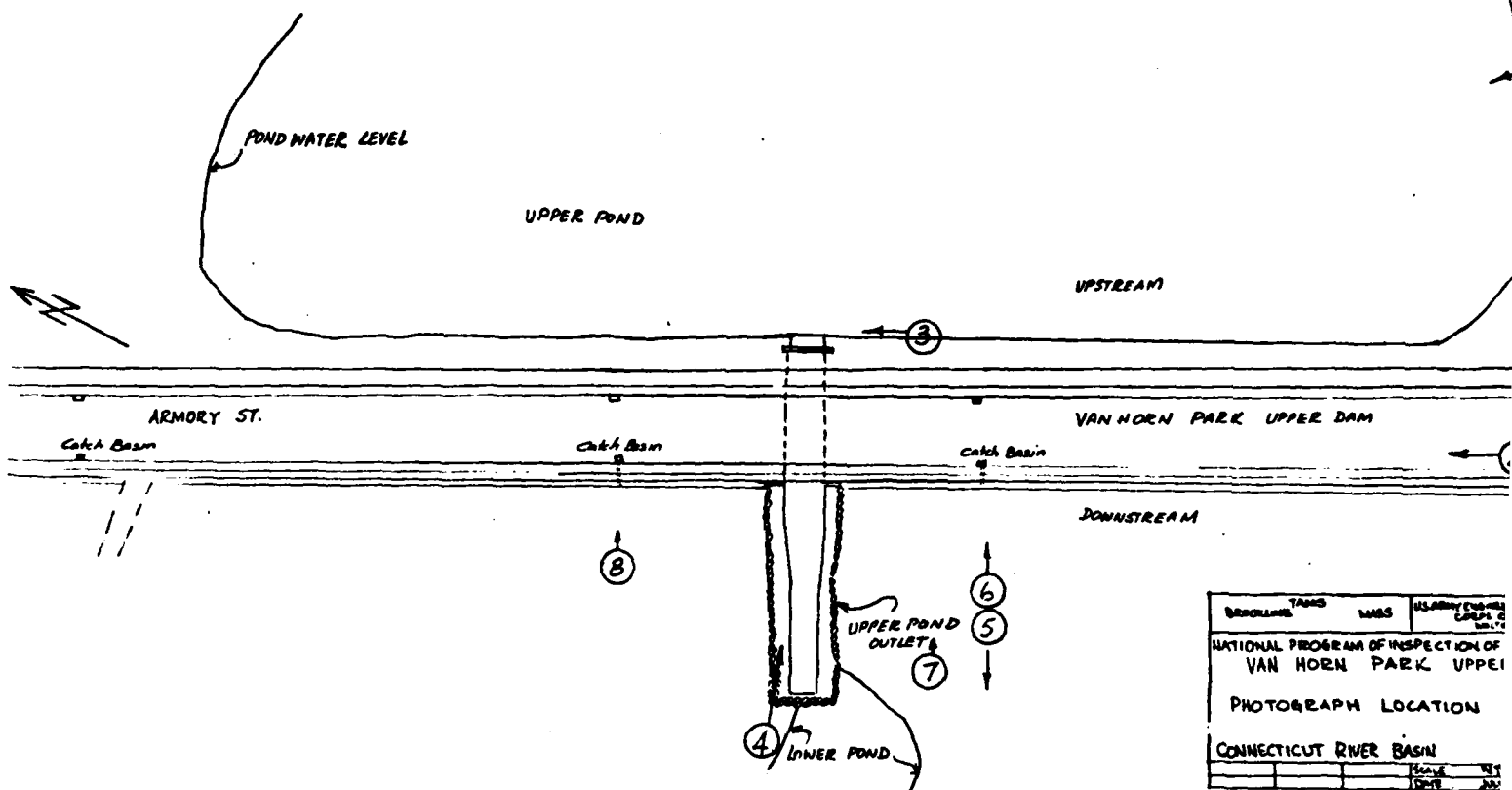
---

---

---

PHOTOGRAPHS

APPENDIX C



| DATE                              | TIME | NAME  | US ARMY ENGINEER CORPS |
|-----------------------------------|------|-------|------------------------|
| NATIONAL PROGRAM OF INSPECTION OF |      |       |                        |
| VAN HORN PARK UPPER               |      |       |                        |
| PHOTOGRAPH LOCATION               |      |       |                        |
| CONNECTICUT RIVER BASIN           |      |       |                        |
|                                   |      | SCALE | 1:1                    |
|                                   |      | DATE  | ADD                    |



② VIEW OF CREST (ARMORY STREET) LOOKING NORTH



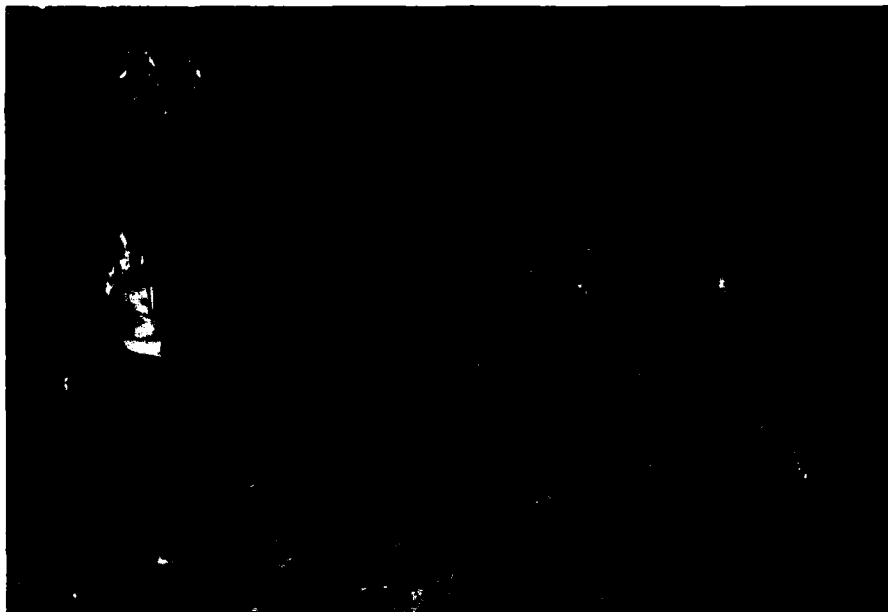
③ VIEW OF UPSTREAM SLOPE LOOKING NORTH, ENTRANCE TO BOX CULVERTS, RIPRAP PROTECTION, DISPLACED HEADWALL AND HEAVY VEGETATION



④ SPILLWAY CHUTE, SHOWING DISPLACEMENT OF LOWER SECTION,  
DISPLACEMENT OF RIPRAP, DEBRIS AND HEAVY VEGETATION



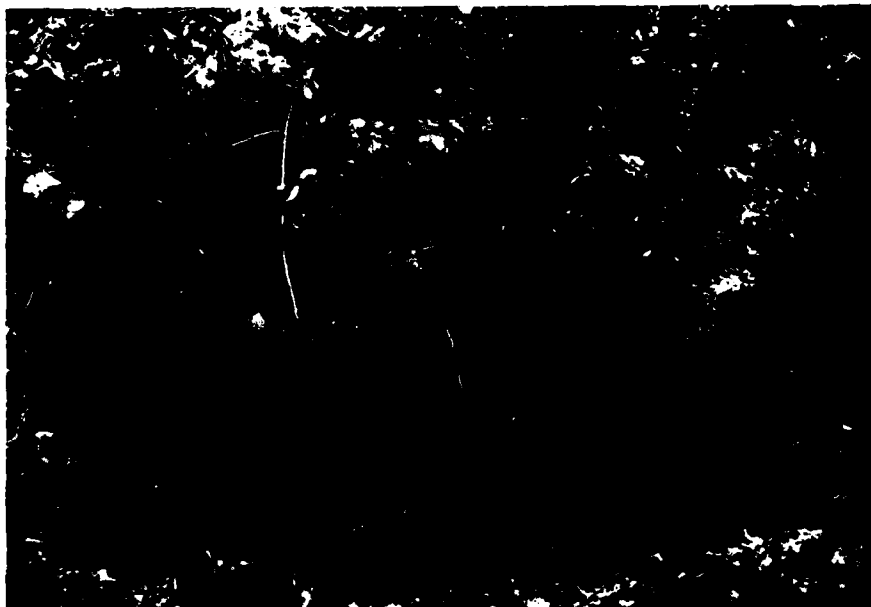
⑤ SEEPAGE AREA IN GULLY FORMED BY FLOW FROM CATCH  
BASIN DRAIN LOCATED ON CREST LOOKING DOWNSTREAM



⑦ SEEPAGE AREA - NOTE LIMONITIC STAINING



⑥ SEEPAGE AREA IN GULLY FORMED BY FLOW  
FROM CATCH BASIN DRAIN LOCATED ON CREST  
LOOKING UPSTREAM



⑧ POTHOLE ERODED BY FLOW FROM CATCH BASIN LOCATED ON CREST

HYDROLOGIC DATA & COMPUTATIONS

APPENDIX D





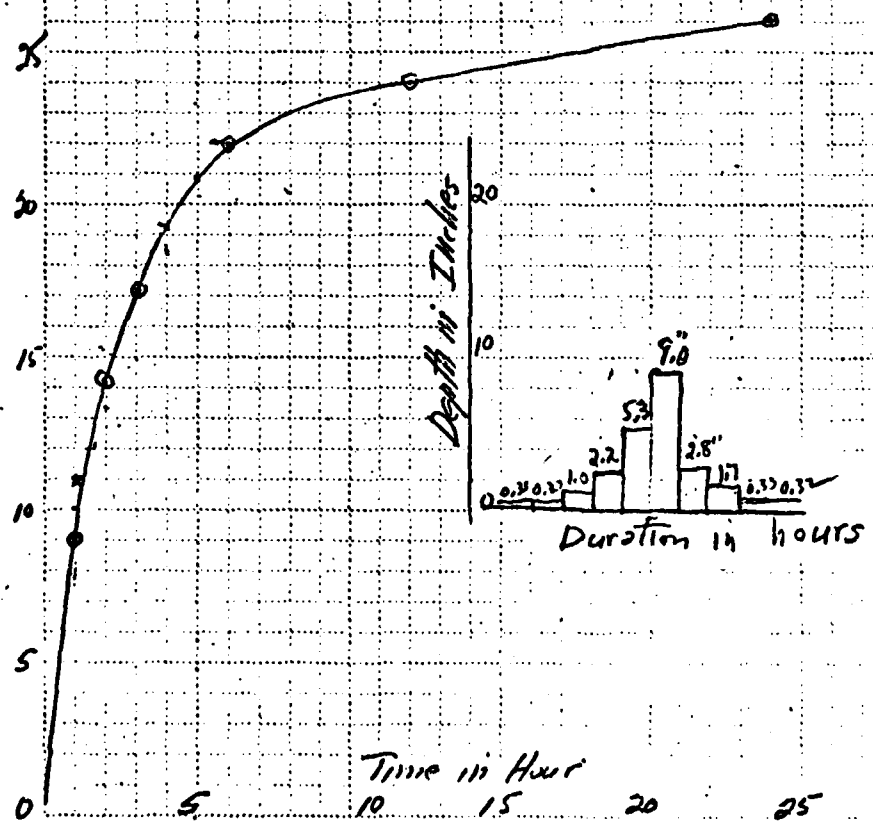
TIPPETTS-ABBETT-McCARTHY-STRATTON  
 Job No. 1497-09, 10 ENGINEERS AND ARCHITECTS NEW YORK  
 Project Dam Inspection, Van Hook Park  
 Subject Design Storm, Upper and Lower Dams

Sheet 2 of  
 Date 6/9/77  
 By GRW  
 Chk. by

Design Storms

| 100-year            |                   | PMP (in mi <sup>2</sup> ) |                |
|---------------------|-------------------|---------------------------|----------------|
| Duration<br>(hours) | Depth<br>(inches) |                           | % of<br>6 hour |
| 0.5                 | 2.2               |                           |                |
| 1.0                 | 2.75              | 9.0                       | 41             |
| 2.0                 | 3.45              | 14.3                      | 65             |
| 3.0                 | 3.85              | 17.1                      | 78             |
| 6.0                 | 4.5               | 22                        |                |
| 12.0                | 5.3               | 24                        |                |
| 24.0                | 6.3               | 26                        |                |

6 hr. P.M.P. = 22"



Job No. 1497-01, 10 TIPPETTS-ABBETT-McCARTHY-STRATTON  
ENGINEERS AND ARCHITECTS NEW YORK  
Project Dam Inspection, Van Horn Park  
Subject Standard Project Storm - Upper Dam

Sheet 3 of  
Date 6/9/76  
By GRW  
Ch'k. by

Assume Standard Project Storm = 50% of P.M.P

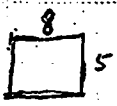
| Time<br>in Hours | Rainfall<br>Excess<br>(in/hr) | Runoff<br>Upper Dam<br>(cfs)<br>(262 ac) |
|------------------|-------------------------------|--|
| 1.0              | 0.16                          | 42                                       |
| 2.0              | 0.50                          | 131                                      |
| 3.0              | 1.10                          | 288                                      |
| 4.0              | 2.65                          | 694                                      |
| 5.0              | 4.50                          | 1179                                     |
| 6.0              | 1.40                          | 367                                      |
| 7.0              | 0.85                          | 223                                      |
| 8.0              | 0.16                          | 42                                       |
| 9.0              | 0.16                          | 42                                       |
|                  | <u>11.48</u>                  |  |

Job No. 1497-09 TIPPETTS-ABBETT-McCARTHY-STRATTON  
 ENGINEERS AND ARCHITECTS NEW YORK  
 Project Dam Inspection, Van Horn Park Sheet    of     
 Subject Storage curve for upper dam Date 5/2/71  
 By G.P.V. Chk. by   

| Elev. | Area | Mean Area | Δ vol | STOR Vol (A.F.) |
|-------|------|-----------|-------|-----------------|
| 168.5 | 9.6  |           |       | 0               |
| 170.0 | 12.8 | 11.2      | 16.8  | 16.8            |
| 171.0 | 14.1 | 13.45     | 13.4  | 30.2            |
| 172.0 | 15.4 | 14.75     | 14.75 | 44.95           |
| 173.0 | 16.6 | 16.0      | 16.0  | 60.95           |
| 174.0 | 17.7 | 17.15     | 17.15 | 78.1            |
| 175   | 18.6 | 18.3      | 18.3  | 96.4            |

Job No. 1497-09 TIPPETTS-ABBETT-McCARTHY-STRATTON  
 Project Dam Inspection, Van Horn Park ENGINEERS AND ARCHITECTS NEW YORK  
 Subject Rating Curve for Outlet of Upper Dam

Sheet of  
 Date 4/2/7  
 By GRW  
 Ch'k. by

| Elev. | Head | Discharge<br>( $Q = CLH^{3/2}$ )<br>(cfs.) | $L = 16'$<br>$C = 3.0$ (neglecting entrance loss)<br> | $\text{Area} = 40 \text{ ft}^2$<br>$\text{WP} = 26$<br>$R = 1.53$ |
|-------|------|--|---|---|
|       |      |  |   |   |
| 168.5 | 0    | 0  |   |   |
| 169   | 0.5  | 17.  |   |   |
| 169.5 | 1.0  | 48.0                                       |   |   |
| 170   | 1.5  | 88.  |   |   |
| 170.5 | 2.0  | 136.0 ✓                                    |   |   |
| 171   | 2.5  | 190.                                       |   |   |
| 171.5 | 3.0  | 249.0                                      |   |   |
| 172   | 3.5  | 314.                                       |   |   |
| 172.5 | 4.0  | 384.0                                      |   |   |
| 173   | 4.5  | 458.                                       |   |   |
| 173.5 | 5.0  | 537.7 (top of culvert)                     |   |   |
| 174   | 5.5  | 619.                                       |   |   |
| 174.5 | 6.0  | 705  |   |   |
| 175   | 6.5  | 795  |   |   |

Assume culvert will flow full:

$$V = \frac{1.486}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$$

$$= \frac{1.486}{n} (1.53)^{\frac{2}{3}} (0.005)^{\frac{1}{2}}$$

$$= 10.6$$

$$Q = AV = (2)(40)(10.6)$$

$$= 848 \quad (\text{too much - will not flow full except under head.})$$

Routing 1 Sheet 1

DAM INSPECTION-VAN HORN PARK  
STANDARD PROJECT STORM-UPPER DAM

INPUT PARAMETERS

| STARTING<br>ELEV<br>(FT.) | TIME<br>INTERVAL<br>(HOURS) | STARTING<br>TIME<br>(HOURS) | ENDING<br>TIME<br>(HOURS) | PRINT<br>INTERVAL | GATE<br>OPTION | PLOT<br>OPTION | STORAGE<br>COEF. | OUTFLOW<br>COEF. | INFLOW<br>COEF. | TIME<br>COEF. | BREAK<br>TIME |
|---------------------------|-----------------------------|-----------------------------|---------------------------|-------------------|----------------|----------------|------------------|------------------|-----------------|---------------|---------------|
| 168.50                    | 0.25                        | 1.00                        | 9.00                      | 1                 | NO             | NO             | 1.000            | 1.000            | 1.000           | 1.000         | 0.000         |

| RESERVOIR<br>ELEV.<br>(FT.) | RESERVOIR<br>STORAGE<br>(ACFT) | RESERVOIR<br>OUTFLOW<br>(CFS) |
|-----------------------------|--------------------------------|-------------------------------|
| 168.50                      | 0.0000                         | 0.00                          |
| 170.00                      | 16.8000                        | 88.00                         |
| 171.00                      | 30.2000                        | 190.00                        |
| 172.00                      | 44.9500                        | 314.00                        |
| 173.00                      | 60.9500                        | 458.00                        |
| 174.00                      | 78.1000                        | 619.00                        |

Routing Sheet 2

| TIME<br>(HRS) | INFLOW<br>(CFS) | OUTFLOW<br>(CFS) | STORAGE<br>(ACFT) | ELEVATION<br>(FT.) |
|---------------|-----------------|------------------|-------------------|--------------------|
| 1.00          | 42.00           |                  | 0.0000            | 168.50             |
| 1.25          | 64.25           | 5.44             | 1.0403            | 168.59             |
| 1.50          | 86.50           | 12.62            | 2.4096            | 168.71             |
| 1.75          | 108.75          | 21.34            | 4.0741            | 168.86             |
| 2.00          | 131.00          | 31.44            | 6.0037            | 169.03             |
| 2.25          | 170.25          | 43.67            | 8.3374            | 169.24             |
| 2.50          | 209.50          | 58.66            | 11.2004           | 169.50             |
| 2.75          | 248.75          | 76.15            | 14.5384           | 169.79             |
| 3.00          | 288.00          | 99.34            | 18.2902           | 170.11             |
| 3.25          | 389.50          | 134.18           | 22.8672           | 170.45             |
| 3.50          | 491.00          | 178.72           | 28.7187           | 170.88             |
| 3.75          | 592.50          | 235.58           | 35.6228           | 171.36             |
| 4.00          | 694.00          | 300.58           | 43.3546           | 171.89             |
| 4.25          | 815.25          | 376.82           | 51.9300           | 172.43             |
| 4.50          | 936.50          | 461.64           | 61.3385           | 173.02             |
| 4.75          | 1057.75         | 556.05           | 71.3951           | 173.60             |
| 5.00          | 1179.00         | 655.19           | 81.9558           | 174.22             |
| 5.25          | 976.00          | 729.65           | 89.8869           | 174.68             |
| 5.50          | 773.00          | 755.19           | 92.6073           | 174.84             |
| 5.75          | 570.00          | 740.43           | 91.0355           | 174.75             |
| 6.00          | 367.00          | 692.49           | 85.9283           | 174.45             |
| 6.25          | 331.00          | 631.93           | 79.4773           | 174.08             |
| 6.50          | 295.00          | 575.70           | 73.4876           | 173.73             |
| 6.75          | 259.00          | 523.03           | 67.8778           | 173.40             |
| 7.00          | 223.00          | 473.31           | 62.5810           | 173.09             |
| 7.25          | 177.75          | 426.45           | 57.6452           | 172.78             |
| 7.50          | 132.50          | 380.41           | 52.3296           | 172.46             |
| 7.75          | 87.25           | 334.51           | 47.2289           | 172.14             |
| 8.00          | 42.00           | 290.30           | 42.1319           | 171.80             |
| 8.25          | 42.00           | 250.71           | 37.4224           | 171.48             |
| 8.50          | 42.00           | 217.43           | 33.4638           | 171.22             |
| 8.75          | 42.00           | 189.51           | 30.1362           | 170.99             |
| 9.00          | 42.00           | 168.04           | 27.3160           | 170.78             |
| MAX. VALUES   |                 |                  |                   |                    |
|               | 1179.00         | 755.19           |                   | 174.84             |
| MIN. VALUES   |                 |                  |                   |                    |
|               | 42.00           | 0.00             |                   | 168.50             |

APPENDIX E  
INFORMATION AS CONTAINED IN  
THE NATIONAL INVENTORY OF DAMS





## INVENTORY OF DAMS IN THE UNITED STATES

| STATE | IDENTITY NUMBER | DIVISION | STATE | COUNTY | CONGR. DIST. | STATE | COUNTY | CONGR. DIST. | NAME                    | LATITUDE (NORTH) | LONGITUDE (WEST) | REPORT DATE |
|-------|-----------------|----------|-------|--------|--------------|-------|--------|--------------|-------------------------|------------------|------------------|-------------|
| MA    | 574             | NED      | MA    | 013    | 02           |       |        |              | VAN HORN PARK UPPER DAM | 4207.6           | 7235.7           | 28JUL78     |

| POPULAR NAME | NAME OF IMPOUNDMENT      |
|--------------|--------------------------|
|              | VAN HORN PARK UPPER POND |

| REGION | BASIN | RIVER OR STREAM      | NEAREST DOWNSTREAM CITY-TOWN-VILLAGE | DIST FROM DAM (MI.) | POPULATION |
|--------|-------|----------------------|--------------------------------------|---------------------|------------|
| 01     | 08    | TR-CONNECTICUT RIVER | SPRINGFIELD                          | 0                   | 164000     |

| TYPE OF DAM | YEAR COMPLETED | PURPOSES | STRUCT. HEIGHT (FT.) | HYDRAU. HEIGHT (FT.) | IMPOUNDING CAPACITIES |                   |
|-------------|----------------|----------|----------------------|----------------------|-----------------------|-------------------|
|             |                |          |                      |                      | MAXIMUM (ACRE-FT.)    | NORMAL (ACRE-FT.) |
| HEPG        | 1957           | R        | 34                   | 32                   | 333                   | 134               |

DIST OWN FED R PRV/FED SCB A VER/DI  
VED N N N N 28JUL

| REMARKS |
|---------|
|         |

| D/S HAS | SPILLWAY |      |             | MAXIMUM DISCHARGE (FT.) | VOLUME OF DAM (CY) | POWER CAPACITY |               |     | NAVIGATION LOCKS |             |              |             |              |             |  |  |  |  |  |
|---------|----------|------|-------------|-------------------------|--------------------|----------------|---------------|-----|------------------|-------------|--------------|-------------|--------------|-------------|--|--|--|--|--|
|         | CAUSEWAY | TYPE | WIDTH (FT.) |                         |                    | INSTALLED (MW) | PROPOSED (MW) | NO. | LENGTH (FT.)     | WIDTH (FT.) | LENGTH (FT.) | WIDTH (FT.) | LENGTH (FT.) | WIDTH (FT.) |  |  |  |  |  |
| 1       | 550      | U    | 16          | 730                     | 73700              |                |               |     |                  |             |              |             |              |             |  |  |  |  |  |

| OWNER               | ENGINEERING BY | CONSTRUCTION BY |
|---------------------|----------------|-----------------|
| CITY OF SPRINGFIELD |                |                 |

| REGULATORY AGENCY |              |           |             |
|-------------------|--------------|-----------|-------------|
| DESIGN            | CONSTRUCTION | OPERATION | MAINTENANCE |
| NONE              | NONE         | NONE      | NONE        |

| INSPECTION BY                     | INSPECTION DATE |     |    | AUTHORITY FOR INSPECTION |
|-----------------------------------|-----------------|-----|----|--------------------------|
|                                   | DAY             | MO  | YR |                          |
| TIPPETTS-ABBETT-MCCARTHY-STRATTON | 01              | JUL | 78 | PL 92-367                |

| REMARKS |
|---------|
|         |

END

DATE  
FILMED

8 - 85

DTI